the Iron Age
A Chilton Publication
THE NATIONAL METALWORKING WEEKLY • DECEMBER 8, 1955

Machine tools: When can you expect delivery?
See page 95

Designed, Built, and Installed by

MESTA



This giant Hydraulic Closed-Die Forging Press exerts a forging pressure of 50,000 Tons to produce aluminum and magnesium alloy components for modern aircraft of all types

50,000 Ton Forging Press

MESTA MACHINE COMPANY
PITTSBURGH, PENNSYLVANIA

THE STEEL THAT CHANGED A FAMOUS AMERICAN EXPRESSION



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Many manufacturers are turning to Copperweld Aristoloy Leaded Steel, "the steel with built-in productivity," to produce quality in quantity.

Ledloy* gives freer machining, faster feeds and speeds and longer tool life.

Ledloy cuts clean for finer finish—often eliminates final machining operation.

*Inland Ledloy License

ARISTOLOY STEELS

COPPERWELD STEEL COMPANY
(STEEL DIVISION) WARREN, OHIO

For further details write for free booklet, "Lead Treated Steels".



XIII

This is the thirteenth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Manganese in Alloy Steels

A common and economical alloying agent, manganese is both highly respected and highly essential. It is one of the most basic elements in alloy and carbon steels; in fact, all analyses contain manganese to some extent. Whenever the content exceeds 1.65 pct, manganese steels are classed as alloy steels.

Manganese is one of the energetic deoxidizers, and has less tendency to segregate within the ingot than most other common elements. It is quite beneficial to surface quality in all carbon ranges and minimizes "red shortness" or susceptibility to tearing and cracking at rolling temperatures.

Manganese contributes markedly to strength and hardness, but to a lesser degree than carbon. Actually, the effectiveness of manganese in this respect depends largely upon the carbon content, for higher-carbon steels are more affected by manganese than are the lower-carbon steels.

Another function of manganese is to decrease the minimum—or critical—cooling rate. In this connection it enhances the hardenability. As might be expected, high manganese content with increasing carbon has a tendency to lower ductility and weldability.

Fine-grained manganese steels attain unusual toughness and strength. Such steels are often used in the making of gears, spline shafts, automobile axles, steam valves, rifle barrels, cylinders for compressed gas, and many other products. With a moderate amount of vanadium added, manganese alloy steels are also used for forgings too large to be liquid-quenched properly.

As mentioned earlier, manganese is one of the most fundamental constituents of steel. If you would care to know more about its properties, applications, and effects in alloy combinations, Bethlehem technicians will be glad to work closely with you. The same holds true, of course, when your problem involves other elements of alloy steel.

And when you require new supplies of steel, remember that Bethlehem manufactures the entire range of AISI standard alloy grades, as well as special-analysis steels and all carbon grades. You can place complete confidence in their quality.

If you would like to have a reprint of this advertisement, or of the entire series from I through XIII, please write to us, addressing your request to Publications Dept., Bethlehem Steel Company, Bethlehem, Pa.

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BETHLEHEM STEEL

the Iron Age

DIGEST OF THE WEEK

Vol. 176, No. 23 December 8, 1955

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THE IRON AGE, published every Thursday, with an additional issue in June, by CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1933, at the Post Office at Philadelphia under the act of March 3, 1879. Price to the metalworking industries only, or to people actively engaged therein, $6 for 1 year, $8 for 2 years in the United States, its territories and Canada. All others $15 for 1 year; other Western Hemisphere countries, $15; other Foreign Countries, $25 per year. Single copies, 50¢. Annual Review Issue, $2.00. Cable: "Ironage," N. Y.

Address mail to Chestnut and 56th Sts. Philadelphia 39, Pa.

NEWS DEVELOPMENTS

MACHINE TOOL PICTURE BRIGHT BUT VARIED—P. 95
Industry-wide survey shows machine tool backlogs lengthening with special tools particularly tight. Standard equipment is available for relatively fast delivery. Heavy milling and broaching machines, automatic lathes and transfer machines carry two year delivery delays. Orders for most metalworking tools jumped in October. Shipments were up too but not enough to cut into big backlogs.

CONGRESS PROBES UNION WELFARE FUND USE—P. 98
A Senate labor subcommittee is hearing of union raids on welfare and pension funds. But witnesses say new laws are not the answer. What's needed, says John L. Lewis, is vigorous prosecution of offenders and a little soul searching by the unions.

INDUSTRY CAN PAY FOR NEW CAPITAL GOODS—P. 100
Machinery and Allied Products Institute which has declared that industry will have to spend $443 billion in the next decade for capital goods if it is to keep pace now tells where the money will come from.

GENERAL MOTORS STILL ON THE GRIDDLE — P. 102
Senate probe of General Motors Corp. enters its fourth week with investigators hearing testimony that GM is tough on the competition. Old antitrust case against GMAC recalled. Dealer spokesmen complain that dealers are at mercy of big car producer. GM officials get chance to tell how the company does business.

EGYPT BUYS ARMS FOR HERSELF AND OTHERS—P. 104
Egypt is paying a good price and getting modern arms from Czechoslovakia. Part of the payment is coming from cotton. But Egypt is acting as arsenal and buying agent for other Arab nations. Oil revenues from the Arab league make possible current procurement.

STATE DEPT. WANTS MORE FOR FOREIGN AID—P. 117
Foreign aid outlays are running about $2.7 billion a year now. State Dept. hints this figure will rise. New Russian coolness is behind the move. Nations flirting with Reds will get smaller allotments.

WHERE AUTOMATIC MACHINES FALL SHORT—P. 123
Close-tolerance work is still a problem for automatic machines, says one builder. He sees product quality improved and costs cut when automated processes can work with uniform precision. As it is now, selective assembly is supplementing machines.

IN METALWORKING

ENGINEERING & PRODUCTION

CHOOSING THE RIGHT BROACHING FIXTURE—P. 135
Modern broaching practice makes use of a variety of work-holding fixtures. Best choice hinges on the part itself, production required, possible before-or-after machining. Rotary-table indexing fixtures, shuttle types, trunnion devices—they're all good in the right places. Here's a rundown of most-used designs.

ULTRASONICS: EFFECTS ON HEAT TREATMENT—P. 139
The grain refining effect of ultrasonic energy applied to mild steel during heat treatment is important theoretically and commercially. It tends to modify the classical theory of how crystals can be altered. Commercially, ultrasonics provides a new control technique for many heat treating processes. By increasing diffusion rates, sonic energy might greatly speed carburizing, carbonitriding, nitriding and chromizing.

CONTINUOUSLY CAST LARGE BRONZE SHAPES—P. 143
Quality bronzes for bearings and other uses are now cast continuously in round or more complex shapes up to 9 in. diam. Smooth surfaces and close tolerances are produced by watertight graphite dies. A gravity-feed, bottom-flow casting technique prevents dirt and dross entrapment. Products to 16 ft can be ordered to exact lengths to minimize scrap-end losses in machining.

TEMPERATURE MATERIAL FOR WELD CHECKS—P. 146
A new fast method of weld inspection uses an optical scanning device and a temperature indicating material. It is well-suited to automatic production by inert gas-shielded arc welding. As many as 12,000 welds can be examined per hour with the low cost process.

PRECISION DIES STAMP DIFFICULT PART — P. 148
A 1½-ton punch insert machined to exact contours is used to form an intricate sheet steel wheel five feet in diam. Surface is scratch-free and smooth, requires no further finishing. Manufacturing costs are 80 pct lower than the original cost of spinning the part.

MARKETS & PRICES

STEEL FABRICATORS STRAIN UNDER BOOM — P. 97
Steel fabricators are enjoying their own boom. This year's sales pickup has brought healthy backlogs. But fabricators face the common supply pinch. Inventories are down. Deliveries are lengthening. Moreover, fabricators have been working with narrow profit margins. Price increases have helped and more are coming next year.

BETTER WIRING MEANS MORE APPLIANCE SALES—P. 99
This year over 60 major utilities are spending over $4 million in adequate wiring promotion. Programs are aimed at the 4 out of 5 U. S. homes needing 100 ampere service entrances to adequately handle increased electrical loads. Improved wiring, experts say, means bigger appliance sales, $5 billion rewiring market.

SHIPMENTS KEEP METAL POWDER MEN SMILING—P. 101
Domestic shipments of iron powder are running almost three times over last year's levels. Shipments of all powders are about double. Biggest use of the iron powders is in bearings. Second largest use is believed to be as a component of the flux coating for welding rods. Copper and lead powders also find growing usage.

STEEL PRICES GOING UP ON A BROAD FRONT — P. 191
The expected rise in steel prices is under way. Selected increases in base prices and extras have been put into effect. Others will follow. The reason: the steel industry needs money for expansion; it also must offset effects of higher costs. Demand continues to exceed supply. Most mills are virtually sold out for first six months of 1956. Conversion deals widespread.

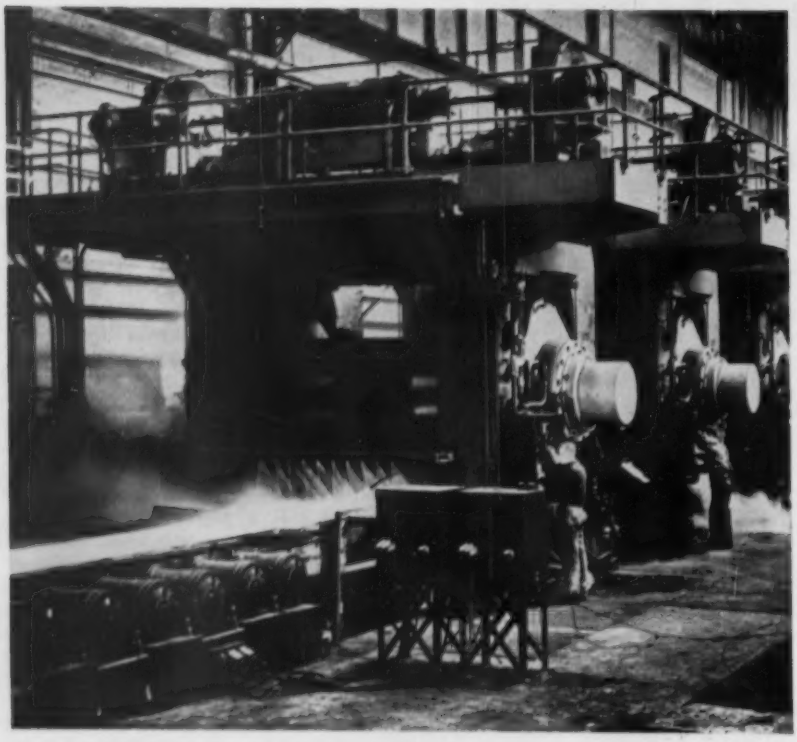
NICKEL "GRAY" MARKET IN EVIDENCE — P. 198
Metal finishers declare a very active "gray" market has sprung up during current nickel shortage. Imports increase not enough to alleviate situation. Electronics manufacturers request government assistance.

NEXT WEEK:

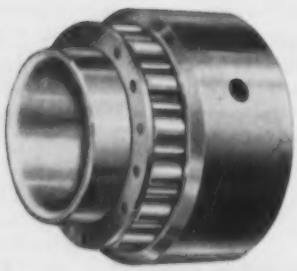
PUNCHED CARDS CONTROL PRODUCTION SCHEDULING
Keeping track of in-process parts is a simple and foolproof matter with this tabulating card system. Paper work in ordering and scheduling of parts is cut in half. Punched cards carry all necessary production information. No multiple copies are needed. System is best used where design is relatively simple.

ARE WE HEADING FOR A SKILLED WORKER SNAG?
Expansion talk centers on funds and markets. But what about skilled workers? Are there enough to go around in our growing economy? What's the skilled worker outlook for metalworking? Next week's report takes up these questions, covering the needs of particular industries, telling what to do about them.

HOW COSTS WILL COME DOWN IN YOUR PLANT



when you hand the heavy loads to HYATTS!



THINGS RUN SMOOTHER LONGER ON

Holding the line on production costs is one of management's highest-priority headaches today . . . and *here, again, is where HYATTS can help you!*

Why HYATTS? Because HYATT Roller Bearings have what it takes to keep on absorbing punishment long after "bargain" bearings have hit the scrap-heap. That gives you a substantial saving on bearings right off the bat. But even more important, HYATTS give you *far more freedom from the production bottlenecks* that cause those high-cost headaches!

HYATTS can do this for you because they're better-engineered and better-built right from the beginning. We take our pick of the choicest steels on the market. Then we heat-treat, machine, fabricate and inspect our bearings with the finest equipment in the business. That's why so many management men agree it's *good business* to have your nearby HYATT sales-engineer on your cost-control team. *He may be able to save you thousands of dollars every year*—why not call him in today?

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STRAIGHT ○ BARREL ○ TAPER ○

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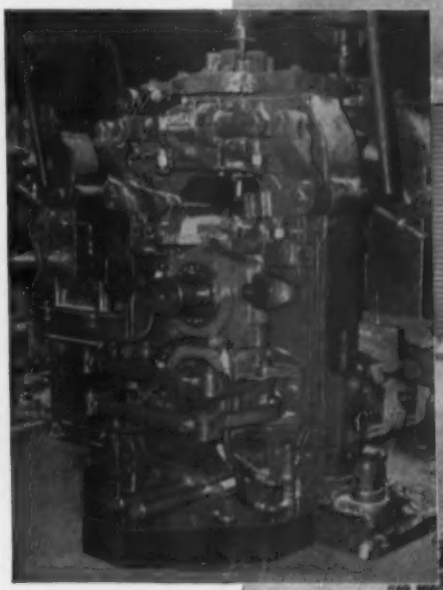


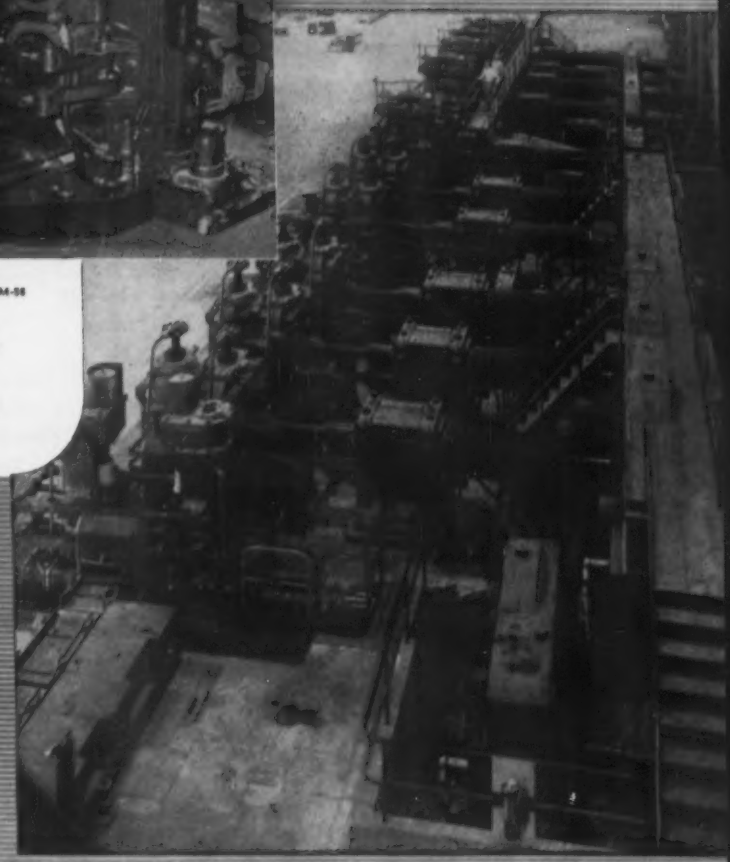
FAIRLESS Makes Records

WITH NEW

MORGAN Skelp Mill

Hailed as one of the great strides toward the increase in American steelmaking capacity is the Fairless Works of the United States Steel Corporation at Morrisville, Pa. National Tube Division's 18" Skelp Mill, a vital part of this enterprise, was designed and built by Morgan Construction Company. Product gauge is assured by rigid closed top roll housings and MORGOIL roll neck bearings. Four ton slabs of steel become four ton coils of high quality skelp. For these, Morgan handling equipment meets exacting requirements for the safety and comfort of the mill operators with no loss of efficiency.





RM-58

MORGAN CONSTRUCTION CO.

WORCESTER, MASSACHUSETTS

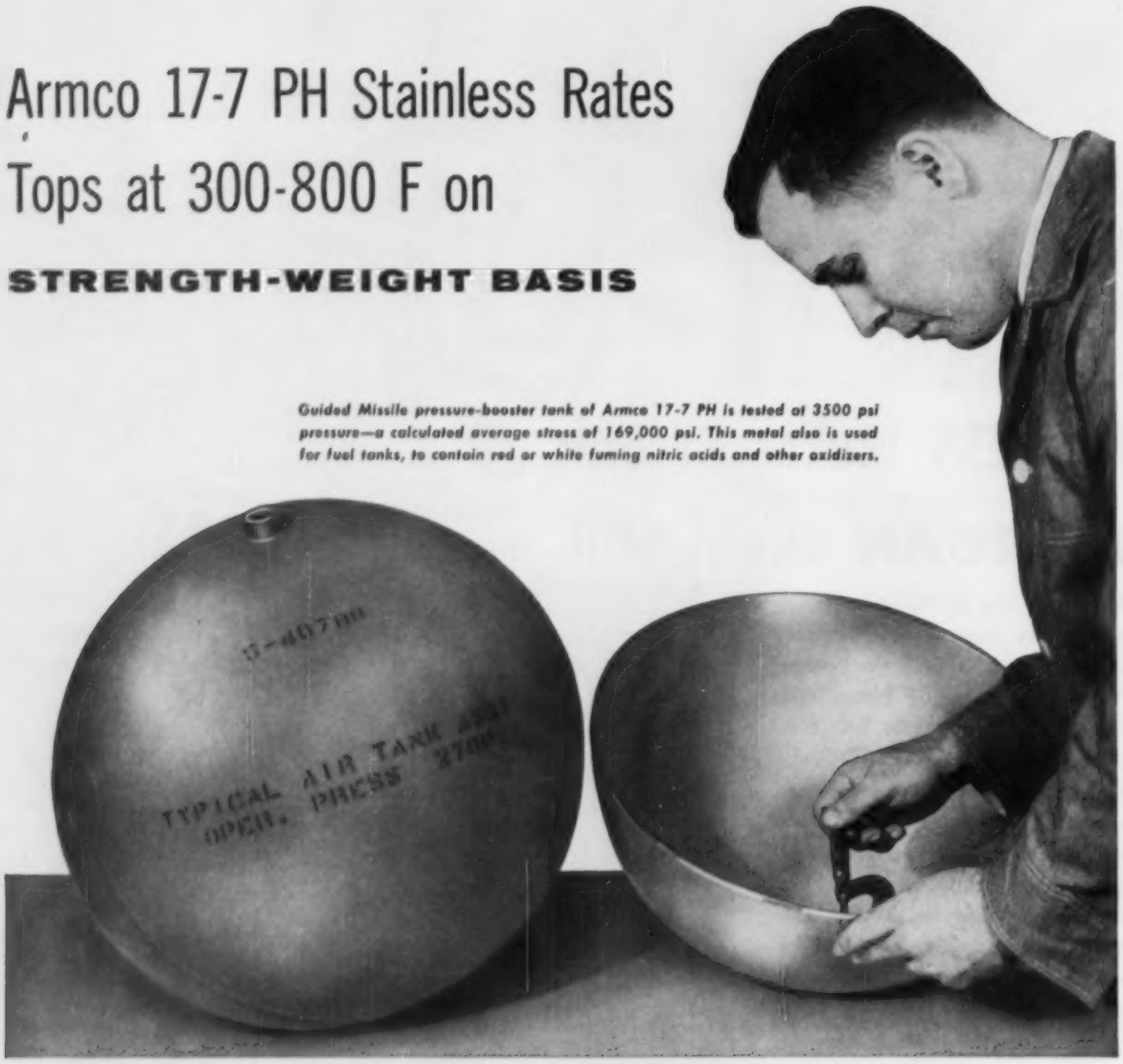
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WIRE MILLS · GAS PRODUCERS · EJECTORS
REGENERATIVE FURNACE CONTROL

Armco 17-7 PH Stainless Rates Tops at 300-800 F on

STRENGTH-WEIGHT BASIS



Guided Missile pressure-booster tank of Armco 17-7 PH is tested at 3500 psi pressure—a calculated average stress of 169,000 psi. This metal also is used for fuel tanks, to contain red or white fuming nitric acids and other oxidizers.

On a *strength-weight* basis, Armco 17-7 PH Stainless Steel is unexcelled for service at temperatures of 300 to 800 degrees F. In this temperature range, Armco 17-7 PH has these pound-for-pound characteristics in comparison with the best ferrous and non-ferrous metals:

**UNSURPASSED SHORT-TIME TENSILE STRENGTH*
**SUPERIOR SHORT-TIME YIELD STRENGTH*
**HIGHER STRESS-TO-RUPTURE STRENGTH*
**HIGHER CREEP STRENGTH*

Yet Armco 17-7 PH is not a costly metal. It is well within the stainless steel price range. Besides having fine corrosion resistance, it is readily fabricated and welded in the soft condition—draws and forms much like 18-8 stainless steel. After fabrication, it takes only a low-temperature double heat treatment at 1400 F plus 1050 F to develop its high mechanical properties.

Armco 17-7 PH is supplied in sheets, strip, plates, bars, angles and wire.

For complete data, just fill out and mail the coupon.

Armco Steel Corporation, 1525 Curtis Street, Middletown, Ohio
Tell me why Armco 17-7 PH is unexcelled on a strength-weight basis for service at 300 to 800 degrees F.

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City:_____ Zone:_____ State:_____

ARMCO STEEL CORPORATION 1525 CURTIS ST., MIDDLETOWN, OHIO

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The Iron Age

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Indexed in the Industrial Arts Index and the Engineering Index.

BPA NBP

Editorial:

We Need Realistic Depreciation!

◆ A BEVY OF EXPERTS has made a report on the whys and wherefores of rapid and regular (if such there be) depreciation. You guessed it. A few of them agree with each other. Some see eye to eye on main points but others are poles apart. With so much high level disagreements, we should take a look.

Instead of going into the subject on an accounting-technical-mathematical basis, let's look at it simply. If we are to carry the present load of national debt; if we are going to live up to an ever increasing standard of living, "something must be done for industry." That something could mean the establishment of a realistic incentive for discarding old equipment and old products.

Business hasn't incentive enough now. The 5-year writeoff wasn't a lasting answer. Most businessmen agree it applied to certain industries and not to others. The long time answer must suit all industry, not just a part of the economy.

If the steel industry is to live up to what others think it owes its customers, it must have a better incentive to finance new capacity. If the machine tool people are to continue to be the keystone of industry, their customers must be able to buy the latest in machine tools.

All this is a must. How it shall be done is something the Treasury Department will have to work out—and quickly. There are all kinds of arguments why industry should or should not get special treatment for depreciation.

We are not interested in why industry should not get faster depreciation. If we are to increase efficiency, pay for fringe benefits, create new wealth, make better products and at the same time pay a $35 billion defense bill each year, we can't depend on old machinery or equipment.

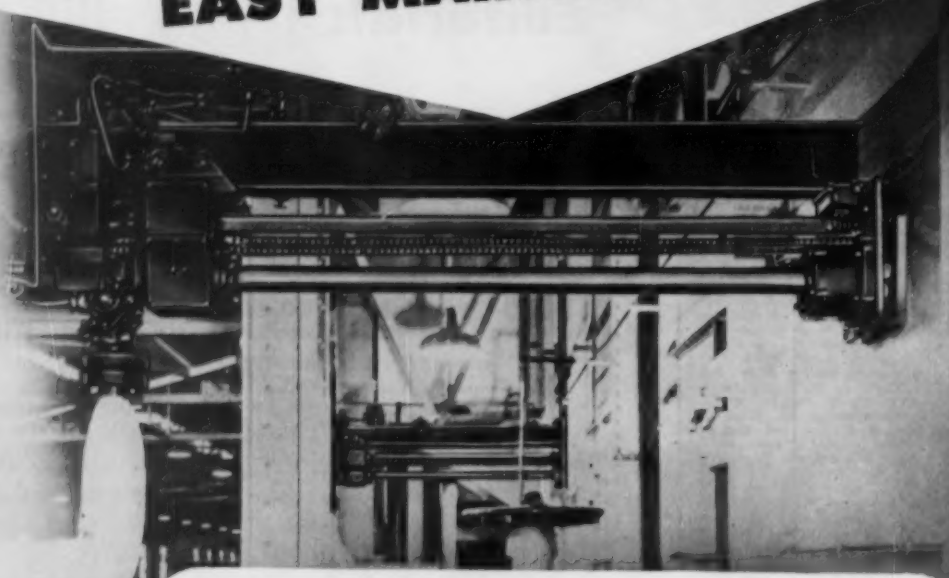
It is unrealistic to expect industry to replace equipment at 4 to 6 times its original cost with an antiquated amortization setup. Business needs a steady stream of new and efficient machinery with which to cut unit cost. There must be an incentive which practically guarantees constant replacement of old and obsolete equipment.

This problem has been in the classroom long enough. The time for the Treasury Department to sponsor legislative action is now. To delay further may lay the groundwork for a serious depression.

Tom Campbell

EDITOR-IN-CHIEF

LOW FRICTION
SELF-CLEANING
EASY MAINTENANCE



VULCAN BLOWERS RELY ON ATLAS
for longer trouble-free service

As the jets move in and out on Vulcan Long Retractable Soot Blowers, manufactured by Copes-Vulcan Division, Continental Foundry & Machine Co., they depend on Atlas Roller Chain to supply the positive drive that needs little lubrication, is self-cleaning and is easily maintained.

Wherever a positive drive is required—low or high speed—there's an Atlas Roller Chain and "precision-matched sprocket" for low maintenance performance. Atlas Chain is toughened for extra wear by an exclusive heat treating process which builds greater strength and wear resistance into every pin, roller and link. It is pre-tested by a series of torture-tests that assure outstanding service on grueling drives or rugged shock loads.

For full rated speeds on your machine, longer wear, lower maintenance get the roller chain with the service "extras". . . pre-tested more than 30 times for longer trouble-free service. Get Atlas Roller Chain and Sprockets . . . write for the Atlas Catalog and Handbook.

ATLAS CHAIN & MANUFACTURING COMPANY
DOYLESTOWN, PENNA.

ATLAS
ROLLER CHAIN AND SPROCKETS

dear editor:

letters from readers

Steel Foundries

Sir:

It was indeed encouraging to read the article by Mr. T. M. Rohan on the steel founders current situation in your November 24th issue.

I, personally, believe this pertinent information is of considerable value to your readers, and trust you will continue from time to time to publish information of interest about the steel foundry industry. *R. G. Ullman, The West Steel Casting Co., Cleveland.*

Color Glaze Process

Sir:

Will you please let us know where we can get more information on the newly developed color glaze process mentioned on page 78 of the November 17th issue? *A. P. Brietzke, Northern Engraving & Manufacturing Co., La Crosse, Wisconsin.*

The process was developed by the Princeton University School of Architecture for The Committee of Stainless Steel Producers, American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y. We suggest you get in touch with the Institute for more data on the process.—Ed.

Ultrasonics for Heat Treatment

Sir:

We have read in the November 17th issue of IRON AGE a paragraph in the "Newsfront" column concerning ultrasonics for heat treatment.

Please furnish us the source of such information. *L. A. Stapleton, Eng. Dept., Scripto, Inc., Atlanta.*

See p. 139, this issue. Perhaps you can suggest a new use.—Ed.

Xerox Printing

Sir:

I am extremely interested in obtaining additional information concerning an article in the May 12, 1955, issue entitled "Communications: Method Cuts Cost of Reproducing Vital Industry Papers."

I would like to get more information on cost and adaptability to individual plant set-ups, and also local representatives of the Xerox equipment. *L. F. Washburne, Polaroid Corp., Cambridge, Mass.*

You can obtain additional information on Xerox printing from the Boston representative of Haloid Corp., 141 Milk Street, Boston 9, or by contacting Haloid Corp., headquarters at 55 Haloid St., Rochester 3, N. Y.—Ed.

Latin American Comment

Sir:

We are extremely grateful for our copy of your 100th anniversary issue of IRON AGE. Our 70 years in the metallurgical trade make us reminiscent readers of the early experiences of your publication wherein we can see some of our own.

Kindly accept our congratulations and the best wishes for the continued success of IRON AGE, the source of so much valuable information for the men in the metalworking industry. *Pedro Merlini E Hijos, Buenos Aires, Argentina.*

What the Editor Wants

Sir:

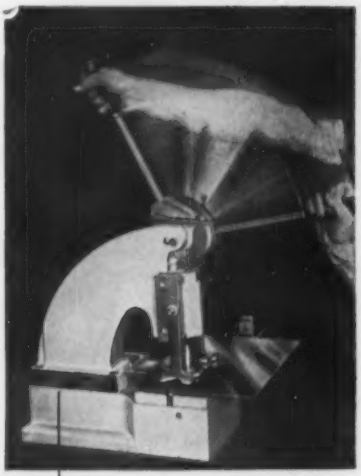
Will you please send me two copies of your booklet, "What the Editor Wants." *J. N. Thompson, Office of Asst. to President, Wheeling Steel Corp., Wheeling, W. Va.*

Free copies of this little booklet on writing news items, personal and new products items, etc., are still to be had for the asking.—Ed.

Induction Heating

Sir:

Please send me two copies of "Induction Heating." *H. G. Peebles, Metallurgist, Detroit Steel Products Co., Detroit.*



PUNCH...
BLANK...
EMBOSS...
FORM...

Quickly, Easily, Accurately with a DI-ACRO* PUNCH PRESS

Deep throats—6 and 12 inches—of Di-Acro Punch Presses make them ideal for many operations impossible to perform on most bench presses.

Holes of various shapes and sizes—as large as 4" in diameter in 16 gauge steel—can be punched. Vee shaped ram controls position of punch head assuring perfect alignment. Turret stripper, of exclusive Di-Acro design, strips material from punches of all shapes. Side and back gauges provide exact work positioning.

*pronounced Die-ack-ro



FOUR HAND AND POWER MODELS AVAILABLE

Di-Acro Power Punch Presses are designed for high speed production. Rated capacity, five tons. 180 strokes per minute. Motor driven flywheel and other moving parts are housed in a welded, steel cabinet.

Hand operated Di-Acro Punch Presses are easy to operate, ideal for short run production and experimental work. Rated capacity, four tons.

PUNCH PRESS ACCESSORIES

Complete line of standard size punches in round, square, notcher, rectangular and oval shapes available in six clearances. Also special sizes.

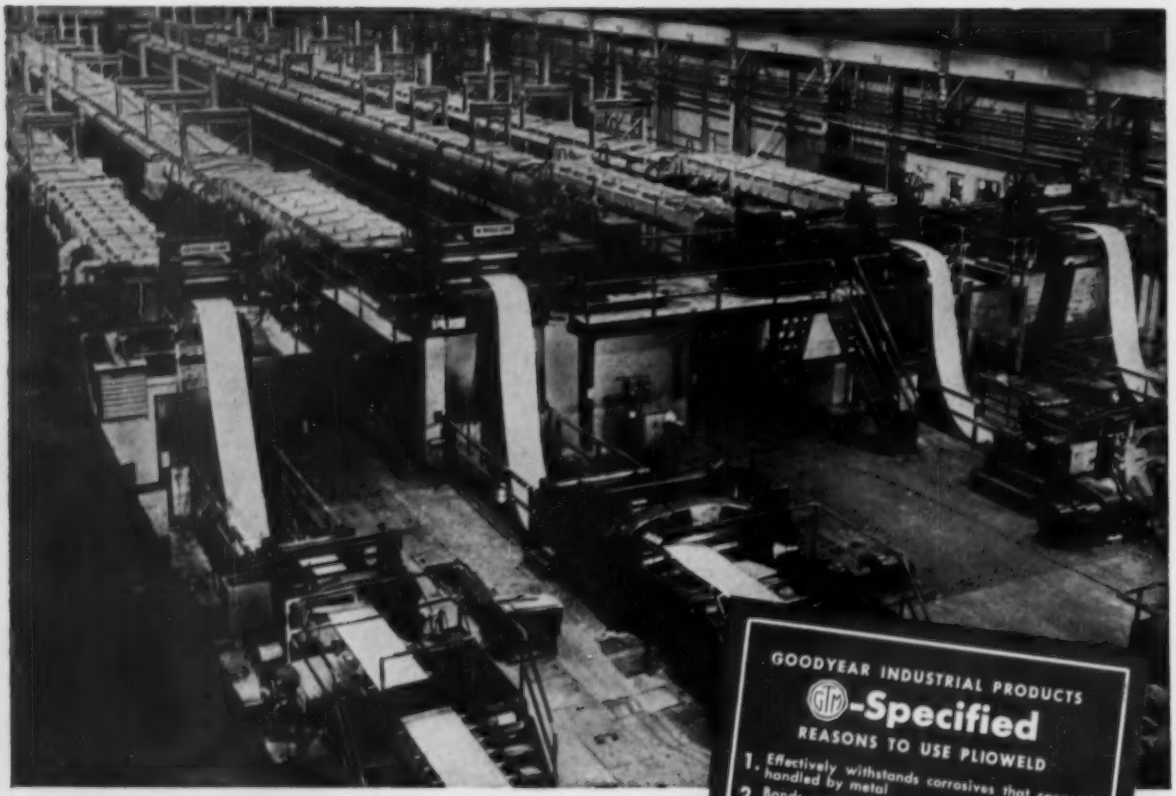
Send for 32-Page Catalog

Tells all about both hand and power operated Di-Acro Punch Presser, Benders, Brakes, Notchers, Rod Parters, Rollers and Shears. Punch and Die Cost Sheet included.

Creators of "Die-Less Duplicating"

O'NEIL-IRWIN MFG. CO.
302 8th Avenue
Lake City, Minnesota

di-acro PRECISION METALWORKING MACHINES



PROVED PROTECTION

for pickle line comes with

PLIOWELD

Acid tanks. Hot and cold water tanks. Tank covers. Piping. Drip pans. Fume ducts. Fume scrubbers. Exhaust fans. Stacks and breeching. These are the points in a pickling line that can be thoroughly protected against chemical attack with rubber bonded to metal—with PLIOWELD.

Secrets of the proved success of PLIOWELD in combating corrosion—and abrasion—are its availability in a range of compounds to meet specific needs and its permanent bond to metal. PLIOWELD does many jobs well and once on the job, it stays there.

Whether your problem is handling acids or alkalies, salts, alcohols, fumes, water or abrasive slurries, the G.T.M.—Goodyear Technical Man—can show you how to improve production and lower costs with PLIOWELD linings and coverings. He also can give you interesting information on rubber covered rolls. For details, see the G.T.M. or write: Goodyear, Industrial Products Division, Akron 16, Ohio

YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

GOODYEAR

THE GREATEST NAME IN RUBBER

Pliowold—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

fatigue cracks

by William M. Coffey

Inside Iron Age

When a big-shot makes a speech the usual procedure is to pass out to the press an advance copy of what he is going to say. No point then in going 2,000 miles to hear the words when you already know what they're going to be, is there? And think of the Chicken-A-La-King you don't have to eat, too. But IRON AGE editors aren't allowed to report affairs this way. They have to go and listen and eat the chicken-a-la-king. Why?

Because the speaker might toss in a hot, unrehearsed news item at the last minute, that's why.

This IRON AGE policy paid off recently when Machinery Editor Ed Eagan (who likes chicken-a-la-king anyway) came up with a news "beat" by keeping his ears open during one of these "prepared-copy" affairs. His November 3 Machine Tool High Spots column was the first printed report that the Defense Dept. had stopped its $200 million program of buying big, special machine tools for its war emergency reserve.

Ed's news item (plus interpretation) was first by a good five days. Rival reporters attending the same National Machine Tool Builders Assn. meeting had equal opportunity to hear the two or three off-the-cuff sentences that he caught. But maybe they didn't rate them as important as Ed did, or else they didn't move as fast in checking it out and getting it into print.

That's the way your ffj works. Keep sending the money.

Coming Events

Your government has just released its "Special Days, Weeks and Months in 1956" booklet. Here are some of the highlights for January and February. Plan now to do your part.

January 1-7 Odorless Decoration Week

January 1-February 15 Louisiana Yam Supper Season

January 14-21 Jaycee Week

January 15-28 Take Tea and See Week

January 18-28 Large Size Week —Chain Drug Stores

January 21-28 National Crochet Week

January 22-29 Pre-Spring Millinery Week

January 23-28 National Potato Chip Week

January 26-February 2 National Fur Care Week

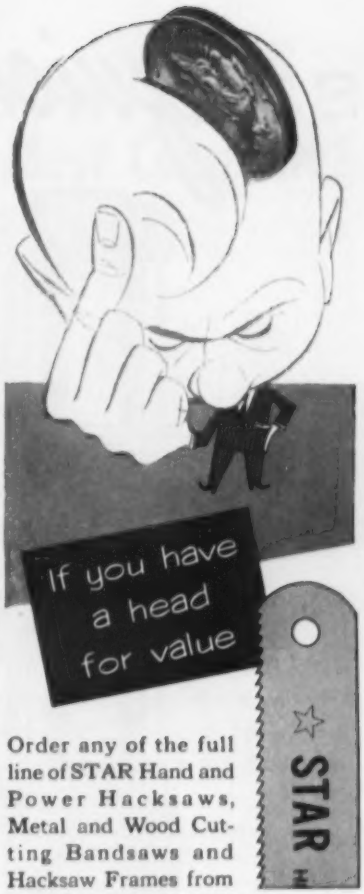
. . . and keep in mind that the whole bloody month of February is "Good Breakfast Month."

* * *

News Item—Washington—The Post Office Department said yesterday it weeded out enough old records to fill 170 freight cars in the last fiscal year.

Puzzlers

That CFA (Caleb Flerk Airlines) pilot must travel 200 mph the last 200 miles to get to his destination on time. Winners: C. Ritter, Brumley-Donaldson Co.; L. B. Kramer, Wetherill Engineering Co.; Albert H. Smith, Alabama Pipe Co.; Wm. E. McCord, Baltimore; C. M. Houston, Moody Engineering Co.) who sent in a whole raft of correct answers to other puzzlers, too); John E. Homer, Jr.; Norman Chase, Jack McCallum and Dave Gromman, all paid-up members in the Collins Radio IRON AGE Puzzle Club; Merrill K. Lemmon, Kane & Roach; C. Leonard Forbes, A. R. Wilfey and Sons; Chris Rick, Du Pont; Ole Ridg came close, may even be right; Lt. Paul Koppel, N. Y. Chemical Procurement District; Albert M. Barloga, Inland Steel Co.; Mr. Letterman made it but, Charlsie lapsed; James Lynch, Lehigh Structural Steel; Gerald J. Robinson; Horst A. Paulat, Engelberg Huller Co.; Ethan A. Smith, The Beryllium Corp.; A. H. Krause, General Electric Co.; and C. W. McKinley, old reliable.



Order any of the full line of STAR Hand and Power Hacksaws, Metal and Wood Cutting Bandsaws and Hacksaw Frames from your Industrial Distributor.

Industry prefers STAR quality, prefers the blades made of carefully heat-treated, top-quality steel, fabricated on specially designed equipment – because STAR consistently delivers fast, economical metal cutting and long blade life.

Be sure to ask your Industrial Distributor for STAR "Moly"® High Speed Steel Blades. STAR developed this high speed, heavily-alloyed steel blade of molybdenum. Remember, "Moly" High Speed blades outlast standard steel blades 10 to 1, cut as well as the *best* high speed steel blades made, but are substantially lower in cost.

FREE! Ask your Industrial Distributor for a supply of our NEW Metal Cutting Booklets and Wall Charts.



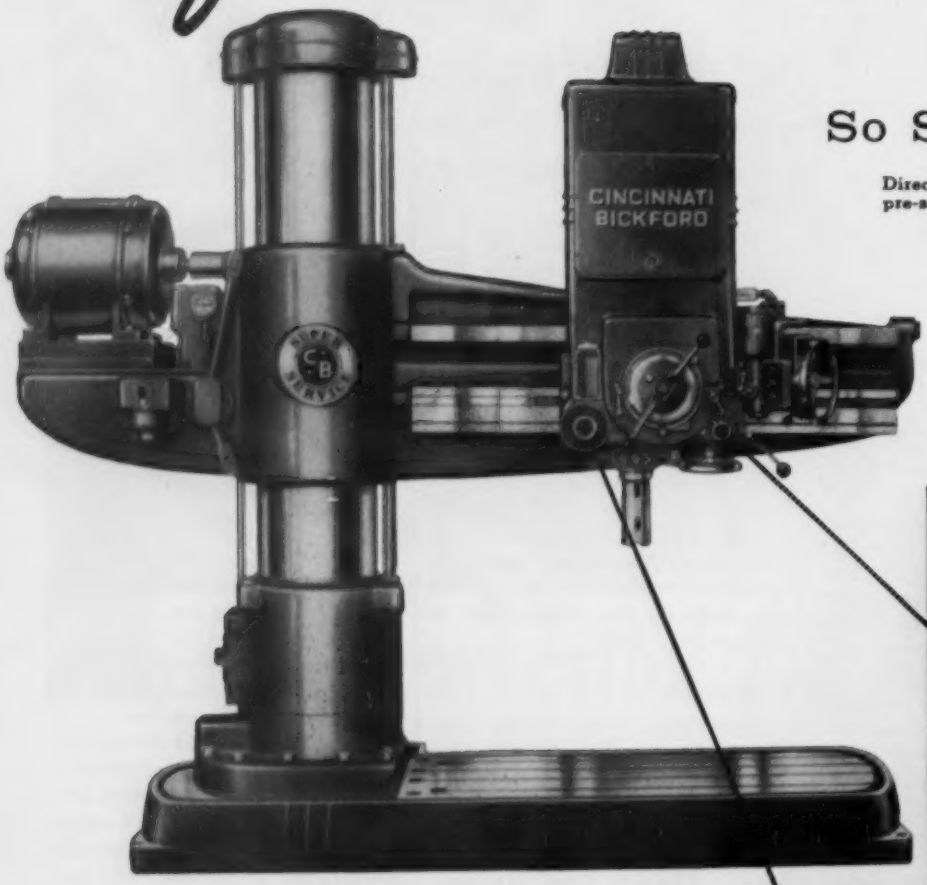
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Makers of Hand and Power Hacksaw Blades, Frames, Metal & Wood Cutting Band Saw Blades and Clemson Lawn Mowers.

So *quick*... So EASY...



So SIMPLE...

Direct and quiet shifting into pre-selected speeds and feeds.



HYDRAULICALLY PRE-SELECTS all 18 feeds

Positive geared tap leads and feeds are quickly pre-set.



HYDRAULICALLY PRE-SELECTS all 36 speeds

Speeds and tool diameters shown in large easy to read figures.

Super-Service Radials are available with complete hydraulic pre-selection of all 36 speeds and 18 feeds. Two convenient direct reading dials control the automatic shifting of sliding gears. While the tool is cutting, merely set the dials to the speed and feed for the next operation. As the spindle is stopping for inserting the next tool, the shifting is done hydraulically . . . directly, quietly and quickly. No other operations—no loss of time. Write for catalogs.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

Subsidiary of GIDDINGS & LEWIS MACHINE TOOL CO. : Fond Du Lac, Wisconsin.

dates to remember

DECEMBER

THE MATERIAL HANDLING INSTITUTE—Annual meeting, Dec. 12 & 13, Statler Hotel, New York City. Society headquarters, 813 Clark Bldg., Pittsburgh.

EXPOSITIONS

1956

ASTE—Industrial exposition, March 19-23, Chicago.

MATERIALS HANDLING SHOW, June 5-8, Cleveland.

JANUARY

INSTITUTE OF SCRAP IRON & STEEL, INC.—Annual convention, Jan. 3-6, Hotel Sherman, Chicago. Society headquarters, 1729 H St., N.W., Washington, D. C.

SOCIETY OF AUTOMOTIVE ENGINEERS, INC.—Annual meeting, Jan. 9-13, The Sheraton-Cadillac Hotel and Hotel Statler, Detroit. Society headquarters, 29 W. 39th St., New York.

AMERICAN ROAD BUILDERS' ASSN.—54th annual convention, Jan. 11-14, Miami Beach, Fla. Assn. headquarters, World Center Bldg., Wash. 6, D. C.

STEEL SHIPPING CONTAINER INSTITUTE, INC.—Winter meeting, Jan. 18-19, Hampshire House, New York City. Society headquarters, 600 Fifth Ave., New York City.

COMPRESSED GAS ASSN., INC.—Annual meeting, Jan. 23-24, The Waldorf-Astoria, New York. Society headquarters, 11 W. 42nd St., New York.

INDUSTRIAL HEATING EQUIPMENT ASSN., INC.—Annual meeting, Jan. 23-24, LaSalle Hotel, Chicago. Assn. headquarters, 155 E. 44th St., New York.

TRUCK-TRAILER MANUFACTURERS ASSN.—15th annual convention, Jan. 23-25, Edgewater Gulf Hotel, Edgewater Park, Miss. Assn. headquarters, 1042 National Press Bldg., Washington, D. C.

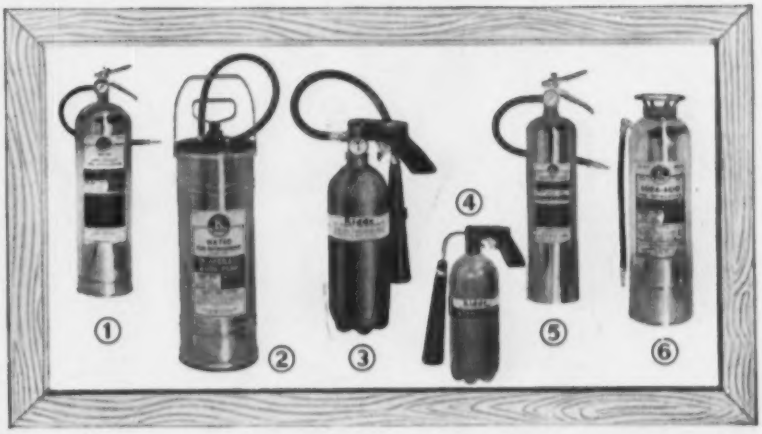
PLANT MAINTENANCE & ENGINEERING SHOW—7th annual conference, Jan. 23-26, Convention Hall, Philadelphia. Society headquarters, Clapp & Polick, Inc., 341 Madison Ave., New York.

NATIONAL RURAL ELECTRICAL COOPERATIVE ASSN. — 14th annual meeting, Jan. 23-26, St. Louis, Mo. Assn. headquarters, 155 E. 44th St., New York City.

AMERICAN STANDARDS ASSN.—Gaillard Seminar on industrial standardization, Jan. 23-27, New York City. Assn. headquarters, 70 E. 45th St., New York.

ENGINEERS JOINT COUNCIL—Second annual general assembly, Jan. 26-27, Hotel Statler, New York City. Society headquarters, 29 W. 39th St., New York.

NOW!
Brand-New Extinguishers Make Kidde Line Most Complete!



Efficient, dependable and superior in design, the new *expanded* line of Kidde extinguishers now makes it easier for you to choose the *right* extinguisher for every fire hazard!

1. Water and anti-freeze. Now available either air-pressurized or cartridge-operated, in either brass or stainless steel, 2½ gallon capacity.

2. Pump tanks. 2½ and 5-gallon sizes, in either galvanized or polished copper tank. Removable all-brass double-action pump throws 40-foot stream.

3. Dry chemical. Air-pressurized in 5 or 10-pound capacities, cartridge-operated in either 20 or 30-pound portables. 150-pound capacity wheeled unit for large hazards.

4. Carbon dioxide. Portables in 2½, 5, 10, 15 and 20-pound capacities, in either trigger or squeeze-valve models. Also wheeled units in single-cylinder capacities of 50, 75 and 100 pounds.

5. Vaporizing liquid. CTC or CBM, pump or air pressure operation with seamless drawn brass shell. Pump capacities 1 to 1½ quarts, pressurized capacities 1 and 1½ quart or 1 gallon.

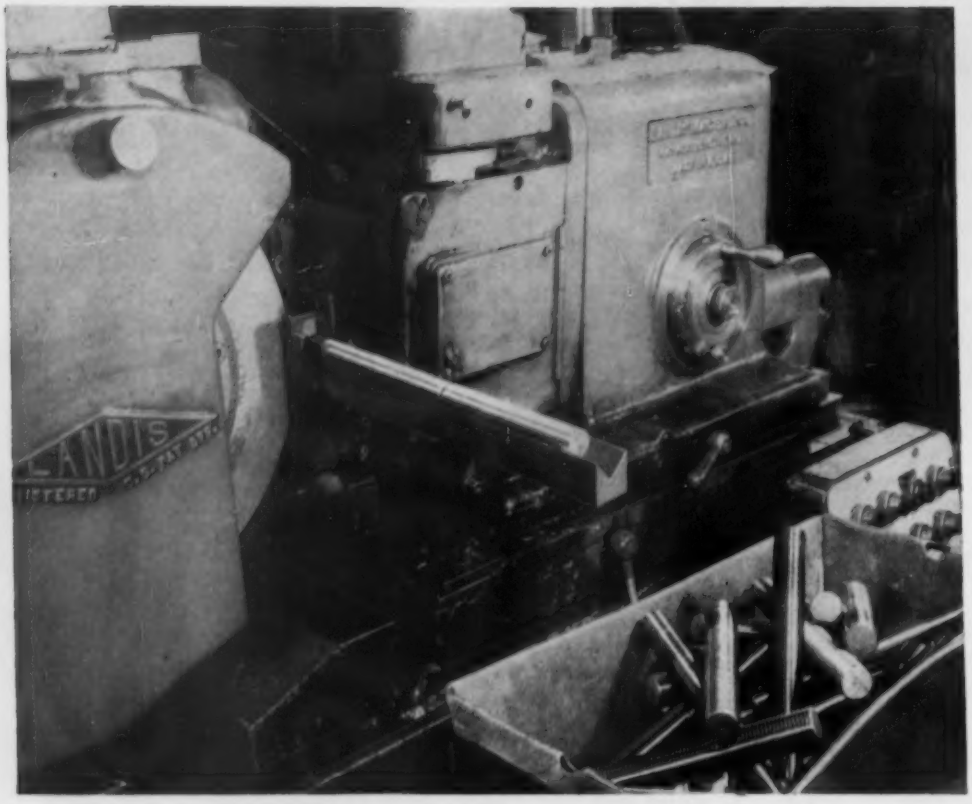
6. Foam and soda-acid. Seamless drawn brass or stainless steel shell, in 2½ gallon size. Also available: 40-gallon soda-acid and foam wheeled units.

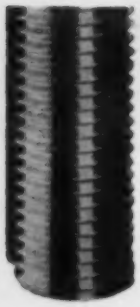
For more information on these and other extinguishers in Kidde's new expanded line, write today for the new Kidde P-8 catalog.

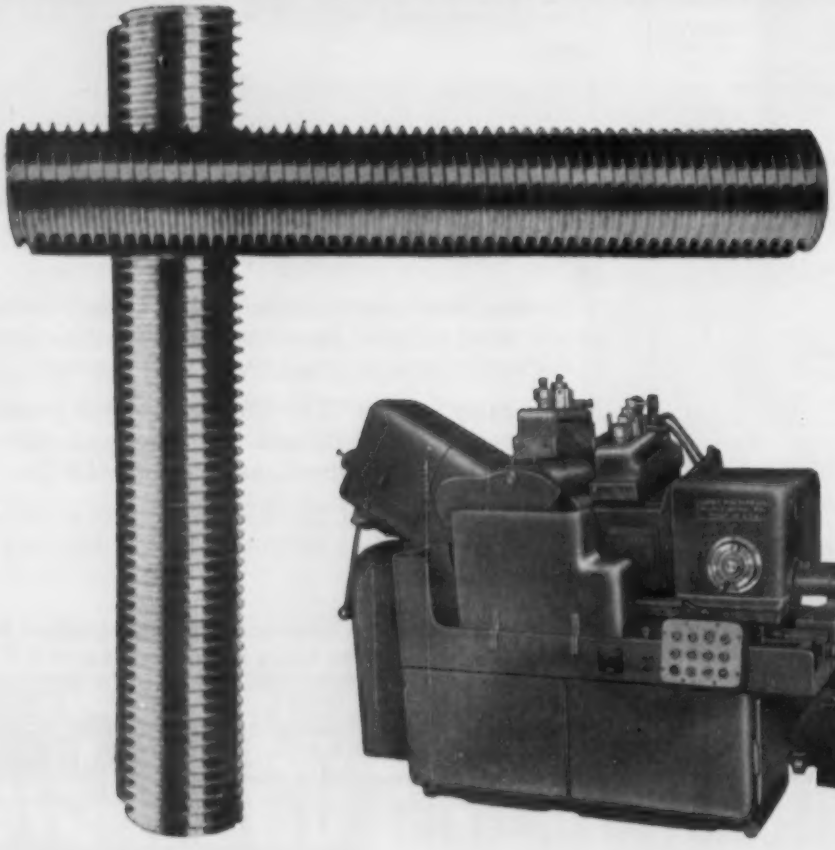
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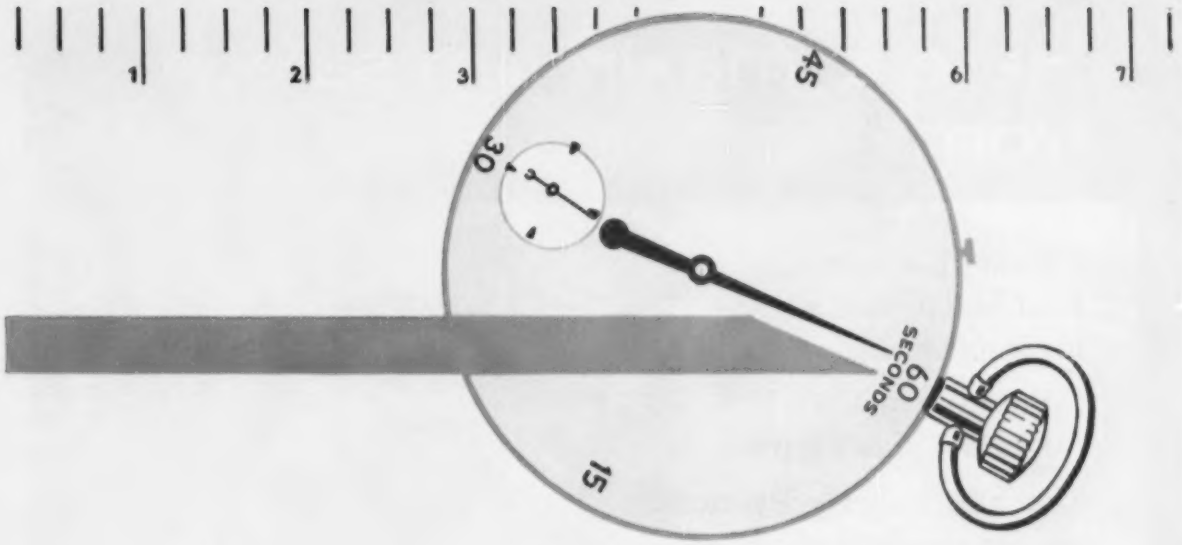
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389-C



Threads 7¼" per Minute by CONTINUOUS GRINDING

LANDIS Centerless Thread Grinders are being used at the Kilbourn Engineering Company in Milwaukee, Wisconsin, to produce continuous threaded studs for high-pressure high-temperature service.

Studs ranging from ⅝" to 1⅜" in diameter are threaded from blanks of SAE 4140 steel heat-treated to a 260-320 Brinell hardness. In the operations illustrated, 1⅛" 8 pitch UN threads must be generated 10" long to a Class 7 fit to meet ASA standards (Manual B1.4). These threads are produced with LANDIS #1 Centerless Thread Grinders by continuous thru-feed grinding at the rate of 7¼ linear inches per minute, **or better.** The excellent quality and smooth finish of the ground thread has reduced final assembly time and minimized galling.

Centerless Thread Grinders, manufactured exclusively by LANDIS, are designed for the high-speed threading of a wide variety of workpieces from 1/16" to 4¾" in diameter. Blanks having one or more diameters, requiring threads on the outer diameter, can be threaded automatically by the thru-feed process used here.

Centerless Thread Grinding, by utilizing the "up-grinding" technique, is also well-adapted for threading workpieces of high hardness and coarse pitch. This process allows up to 30% higher work surface speeds, and often eliminates secondary threading passes required by other methods. For further information, send specifications and ask for Bulletin E-97.

LANDIS *Machine* CO. WAYNESBORO PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURERS OF THREAD GENERATING EQUIPMENT

Here is maximum safety from hydraulic fires!

Pydraul F-9 hydraulic fluid was poured onto molten metal.

But even at 1200° F. Pydraul didn't burn.

That's because the Pydrauls are fire-resistant *chemicals*. They have all the lubricity of premium petroleum oil without the fire hazard, plus being noncorrosive, chemically stable, nontoxic, and reclaimable.

Whatever the temperature conditions and viscosity requirements of your hydraulic equipment, one of the specially tailored Pydrauls will keep it operating smoothly and efficiently with all the SAFETY possible.

Can you honestly afford *not* to use it?



Use Pydraul F-9, Pydraul 150, or Pydraul 600 in your hydraulic equipment. For FREE copy of informative "Pydraul F-9" booklet, or data on Pydraul 150 and Pydraul 600, write: Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478-J-8, St. Louis 1, Mo.

LISTED UNDER REEXAMINATION SERVICE UL UNDERWRITERS' LABORATORIES, INC.

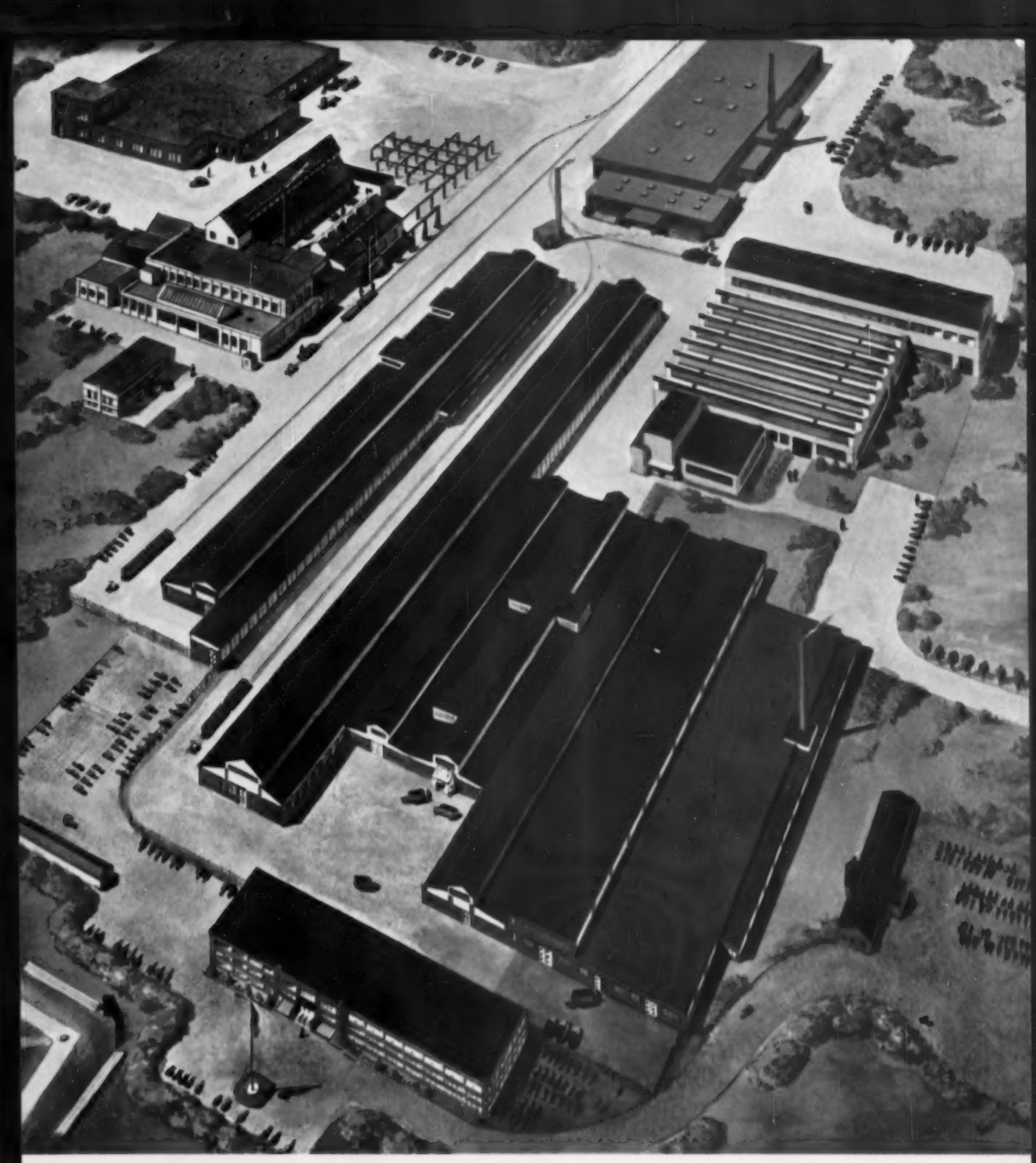
PYDRAUL F-9—FIRST AND ONLY HYDRAULIC FLUID LISTED BY UNDERWRITERS' LAB

On May 31, 1955, Pydraul F-9 became the first fire-resistant hydraulic fluid listed by Underwriters' Laboratories. From the Laboratories' Service Card: "The fire hazard of (Pydraul) is rated 2 to 3 in accordance with Underwriters' Laboratories, Inc.'s Standard of Classification in which Ether rates 100, Gasoline rates 90-100, Alcohol(ethyl) rates 60-70, Kerosene (100°F. flash) rates 30-40 and Paraffin oil rates 10-20." See Underwriters' Laboratories, Inc.'s guide no. 540 18, File MH6049.

Pydraul: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS—PLASTICS

WHERE CREATIVE CHEMISTRY WORKS WONDERS FOR YOU

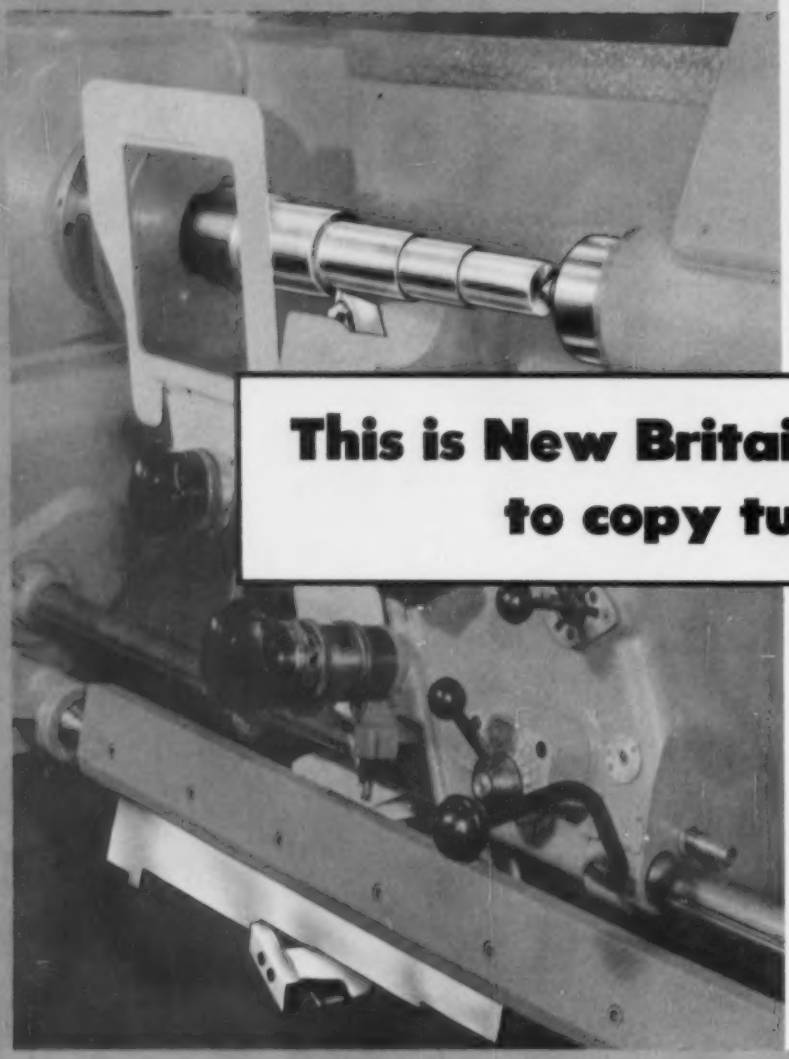


This is The New Britain Machine Company . . .

A composite view of The New Britain Machine Company's six plants in New Britain, Connecticut; Springfield, Massachusetts; Cleveland, Ohio; and Dayton, Ohio . . . built on a foundation of sixty years of service to the world's metalworking industries. Its machine tool divisions produce:

- **Automatic Bar Machines**
- **Automatic Chucking Machines**
- **Precision Boring Machines**
- **New Britain +GF+ Copying Lathes**
- **Lucas Precision Horizontal Boring, Drilling and Milling Machines**
- **Special Automatic Metalworking Machines**

For news of New Britain developments that could improve *your* production methods, see the four following pages.

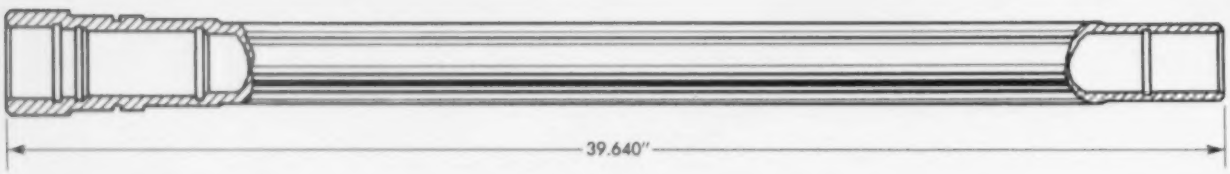


See it in operation

Ask your New Britain representative for a showing of the color motion picture "A NEW APPROACH TO COPY TURNING." Or write The New Britain Machine Company, New Britain, Connecticut.

This is New Britain's approach to copy turning

Can you find profit opportunities in *your* shop with this new approach? Let your New Britain man help you . . . that's his business.



Saves $10 per piece and $3,000 worth of gauges plus labor and overhead on two machines

These are the five operations which formerly required four separate set-ups on three different machines: (1) Rough turn three Outside Diameters, (2) rough turn four Outside Diameters, (3) face large end, center, bore three Inside Diameters, undercut and chamfer three surfaces, (4) face end to length, bore center and undercut, (5) finish turn six Outside Diameters, undercut, form radii and chamfer — all this machining is done in five operations on one New Britain +GF+ Copying Lathe.

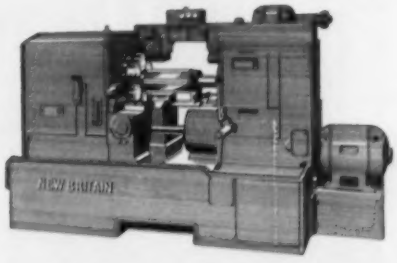


New Britains are "naturals" for work like this

New Britain alone makes *both* tool rotating



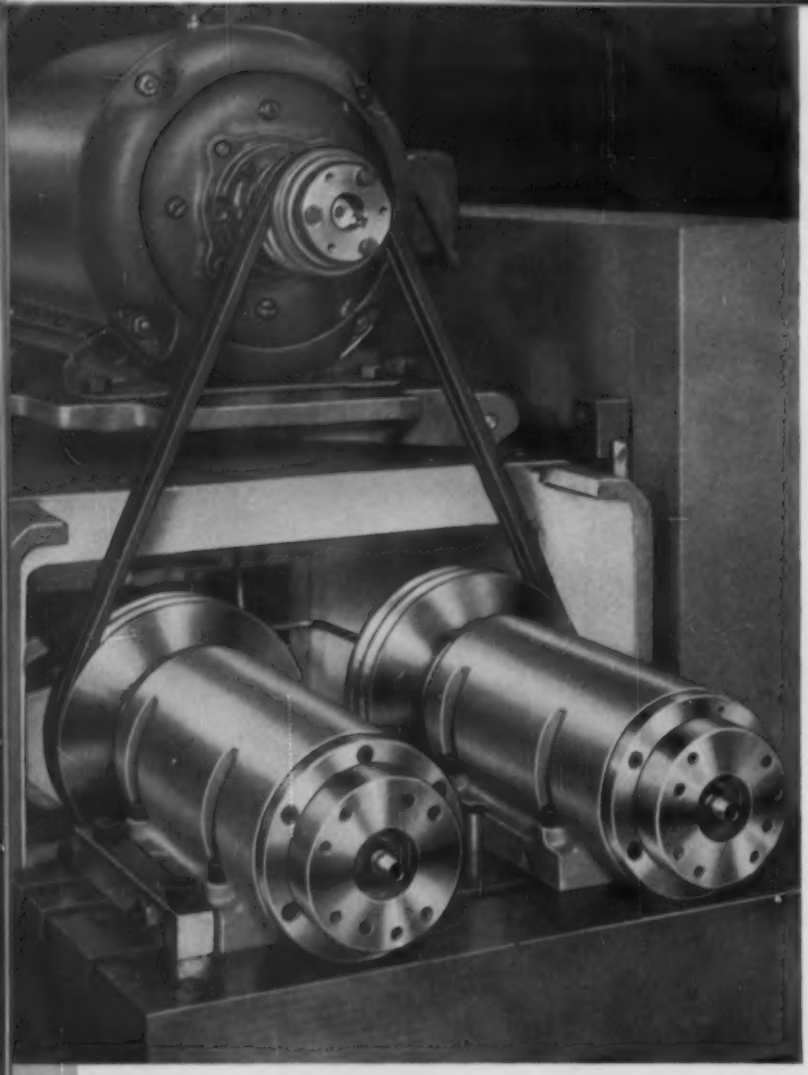
and



work rotating chucking machines, to

provide the best approach to economical production of your work.

The two preceding pages and two following present other New Britain *New's*.



Spindle accuracy is the first essential to holding close tolerances on a boring machine. To utilize this accuracy New Britain spindles are mounted on a stationary bridge securely bolted to the rigid frame of the machine. Drive motor is mounted on a separate bridge above the spindles . . . table is not affected by motor heat and vibration.

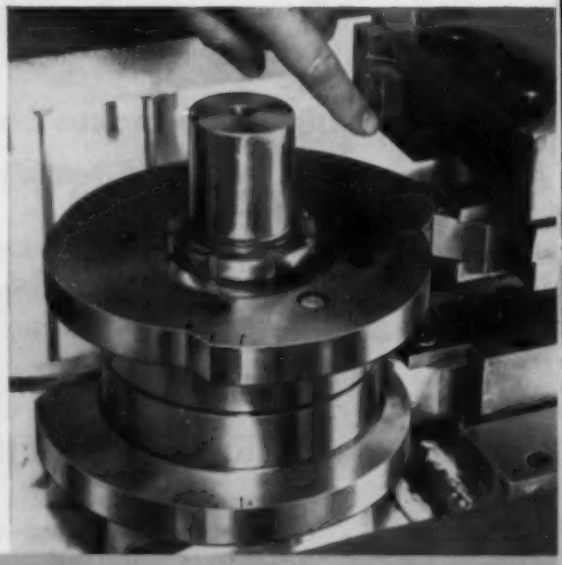


Secret of permanent boring machine accuracy:

Pinpoint control protected by the mass of the machine

A true running cam shaft preserves the accuracy of the tool path. Easily accessible precision cams are mounted on a shaft, straddle mounted directly to the frame of the machine (top bearing bracket has been removed in this photo). Top and bottom cam shaft bearings are a minimum distance from the cam. The shaft keeps its accuracy because of this rigid mounting, and also because the thrust from both cam followers is in one direction.

New Britain Precision Boring Machines have provided a new approach to the fast production of problem pieces in America's leading high output plants. Ask your New Britain man or write The New Britain Machine Co., New Britain, Conn., for the book, "24 COST CUTTING JOBS."



the new **PARKER**

This is an easy job for a Lucas

LUCAS of CLEVELAND

This twenty-foot weldment requires a combination of milling, boring and key slotting, all of which are performed in one setting. Backrest was removed from the machine, and the work is supported on an auxiliary table. *(Photo courtesy Steel Equipment Co., Cleveland, O.)*



This awkward work piece is another demonstration of Lucas flexibility. A LUCAS PRECISION HORIZONTAL BORING, DRILLING AND MILLING MACHINE does a wide range of work easily, accurately and inexpensively. You have ruggedness, accuracy and flexibility of work handling that you can count on.

Automatic power positioning enables you to positively repeat operations on any number of pieces. New ultra-simple pendant control is always at the operator's fingertips. Let your Lucas representative show you how far your machine-tool dollar can go, invested in this most versatile machine in any shop.

LUCAS MACHINE DIVISION
The New Britain Machine Company • Cleveland 8, Ohio

The NEW BRITAIN MACHINE COMPANY

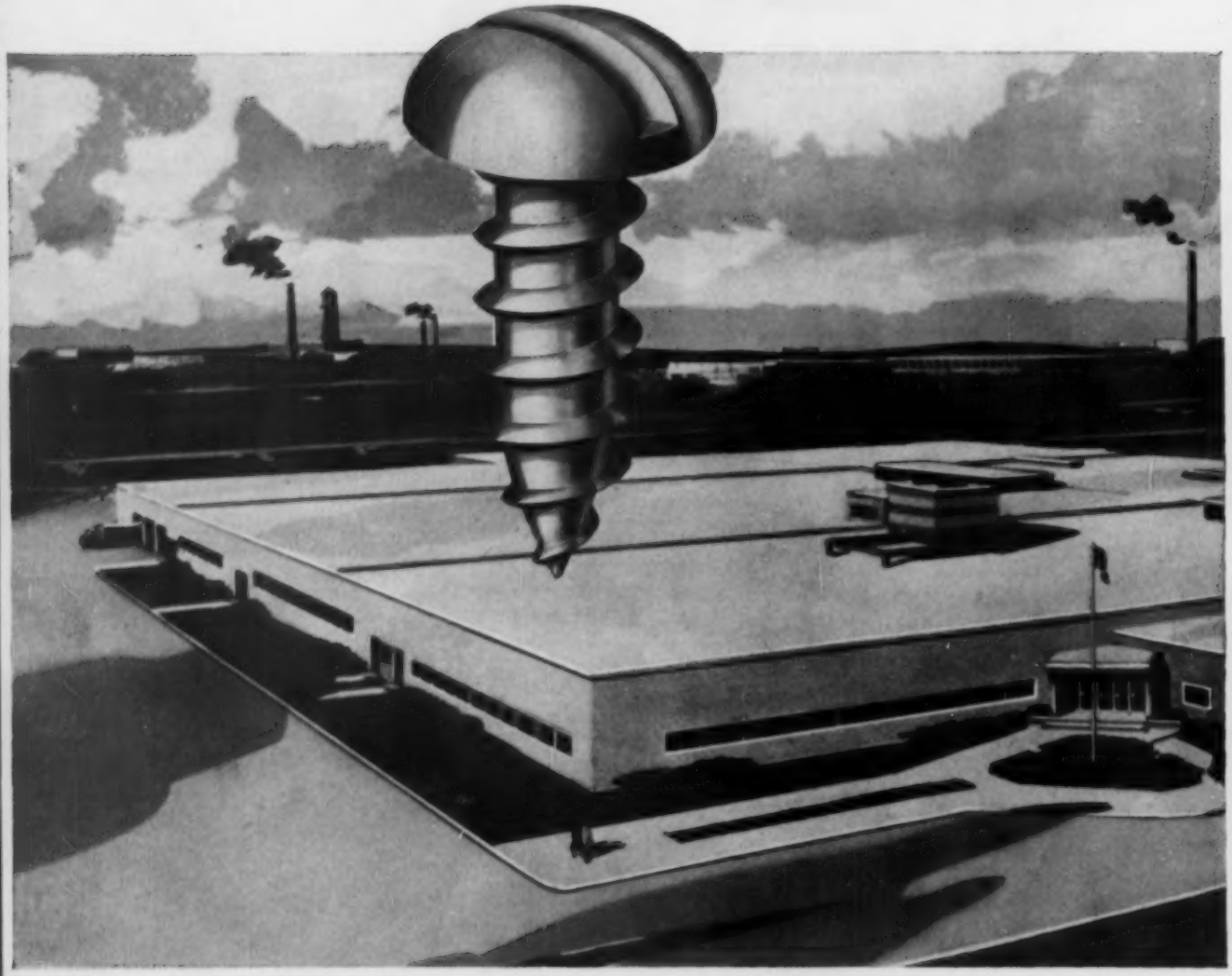
New Britain-Gridley Machine Division, New Britain, Connecticut
Lucas Machine Division, Cleveland 8, Ohio

• AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES
• LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES • NEW BRITAIN +GF+ COPYING LATHES

See the preceding four pages for other New Britain *New's*.

KALON®

the new PARKER



IN CLIFTON, N. J. About 10 miles from New York City.

267,000 SQUARE FEET of floor space, with 225,000 sq. ft. for manufacturing: the remainder for offices, shipping, etc.

PRODUCTION-FLOW DESIGN Single-floor lay-out that permits progressive flow of products through processing operations.

MECHANIZED MATERIALS-HANDLING Special conveyor systems and other modern equipment provide advanced degree of automation, and speed production.

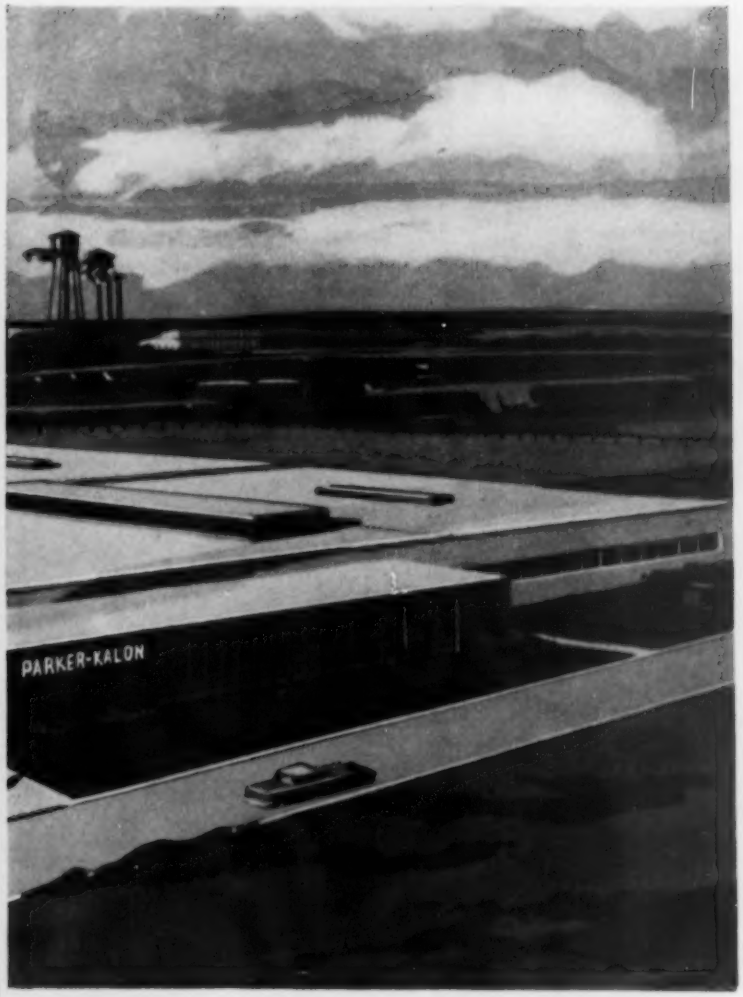
AUTOMATIC HEAT TREATING equipment, of P-K design, is typical of new production facilities for highest efficiency.

ADVANCED QUALITY CONTROL Newest inspec-

SELF-TAPPING SCREWS • SOCKET SCREWS • SCREWNAILS • MASONRY NAILS



-KALON® plant . . .



Production facilities matched with an unequalled experience . . . to offer you more assembly savings

Starting with a revolutionary idea, the *original* Sheet Metal Screw, Parker-Kalon has become the leading manufacturer of Self-tapping Screws and other fasteners essential to low-cost assembly of thousands of the nations best-known products.

Industry's reliance on Parker-Kalon has brought about this growth, and the new Parker-Kalon plant, in a real sense, was built to your specifications.

In this great new plant, P-K Fasteners will be produced in larger volume to meet steadily increasing demand. Advanced engineering facilities will also contribute to P-K progress in research and development.

Parker-Kalon's unequalled "know-how" is now matched with the finest facilities for all operations. Now, more than ever, you can be sure . . . "If it's P-K . . . it's OK!"

tion and testing equipment guards P-K quality standards.

PACKING AND SHIPPING area is fully equipped for rapid handling of large stocks and shipment of orders.

AIR-CONDITIONED LABORATORY provides all modern requirements for research, fastener development, and performance tests.

PARKER-KALON DIVISION

General American Transportation Corporation,
Clifton, New Jersey

Sold through leading Industrial Distributors

STAPS* • WING NUTS • THUMB SCREWS



*Registered Trade-mark

CINCINNATI RIGID SHAPERS

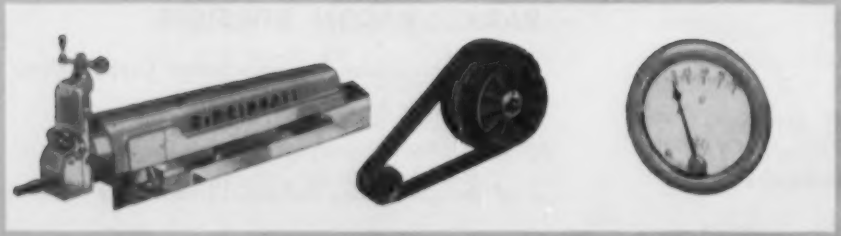
New—modern—these Rigid Shapers offer faster, more convenient controls, greater accuracy, greater dependability. The New nodular iron ram, trunnion and vise, and wide heavily ribbed column give a new rigidity—increase accuracy in cutting.

The New slot-free ram also eliminates the manual clamping of ram adjustment—a time saving feature.

A speedy, dependable electro-magnetic brake and clutch insure a faster performance.

50 P.S.I. pressure lubrication, exclusive on Cincinnati Shapers, is a real insurance against wear and a guarantee of long trouble-free performance.

Write for the circular on the New Rigid Shapers.

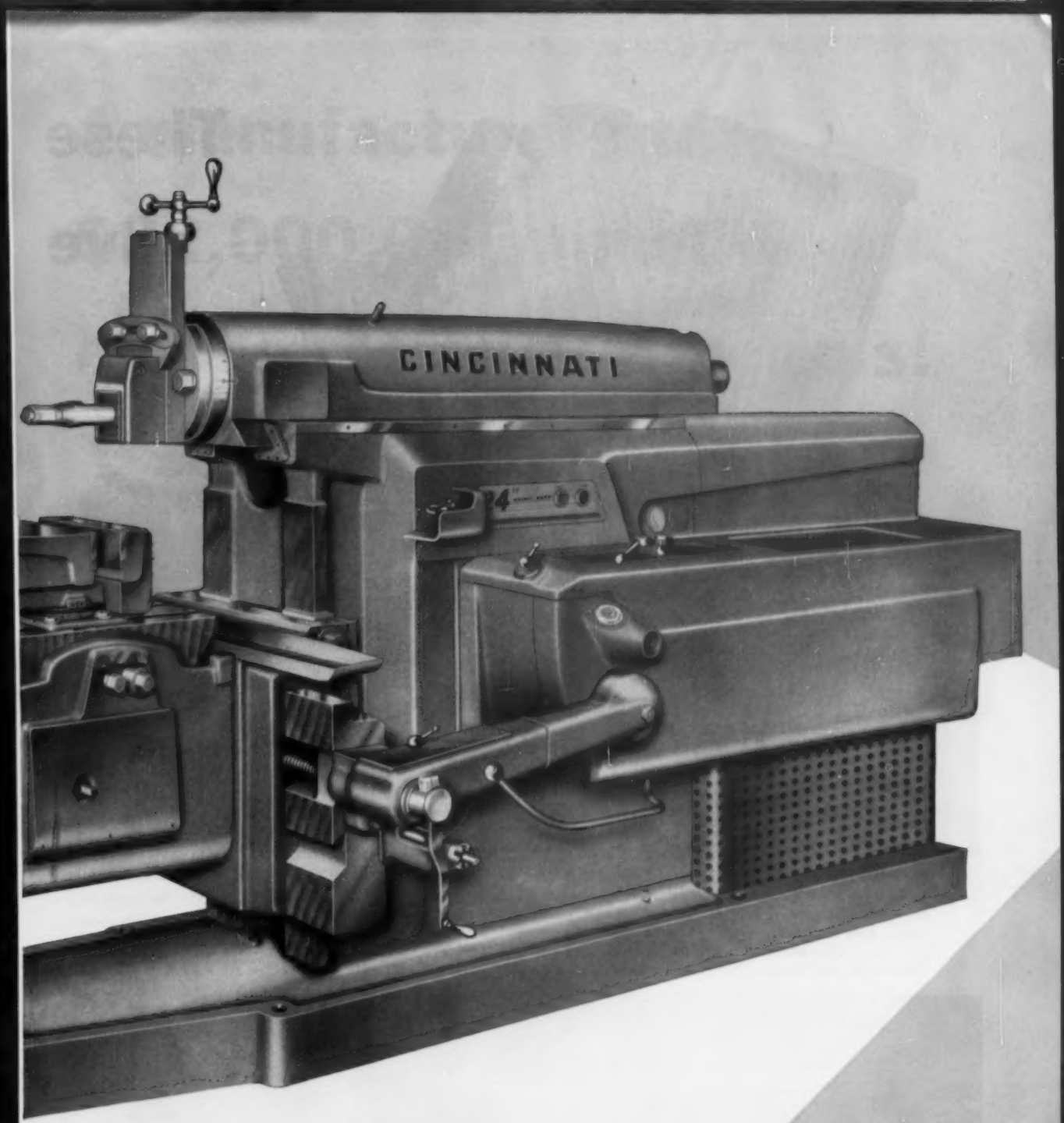


Nodular iron, slot-free ram

Electro-magnetic Clutch and Brake

The only shaper with 50 P.S.I. lubrication

*Registered Trade-mark



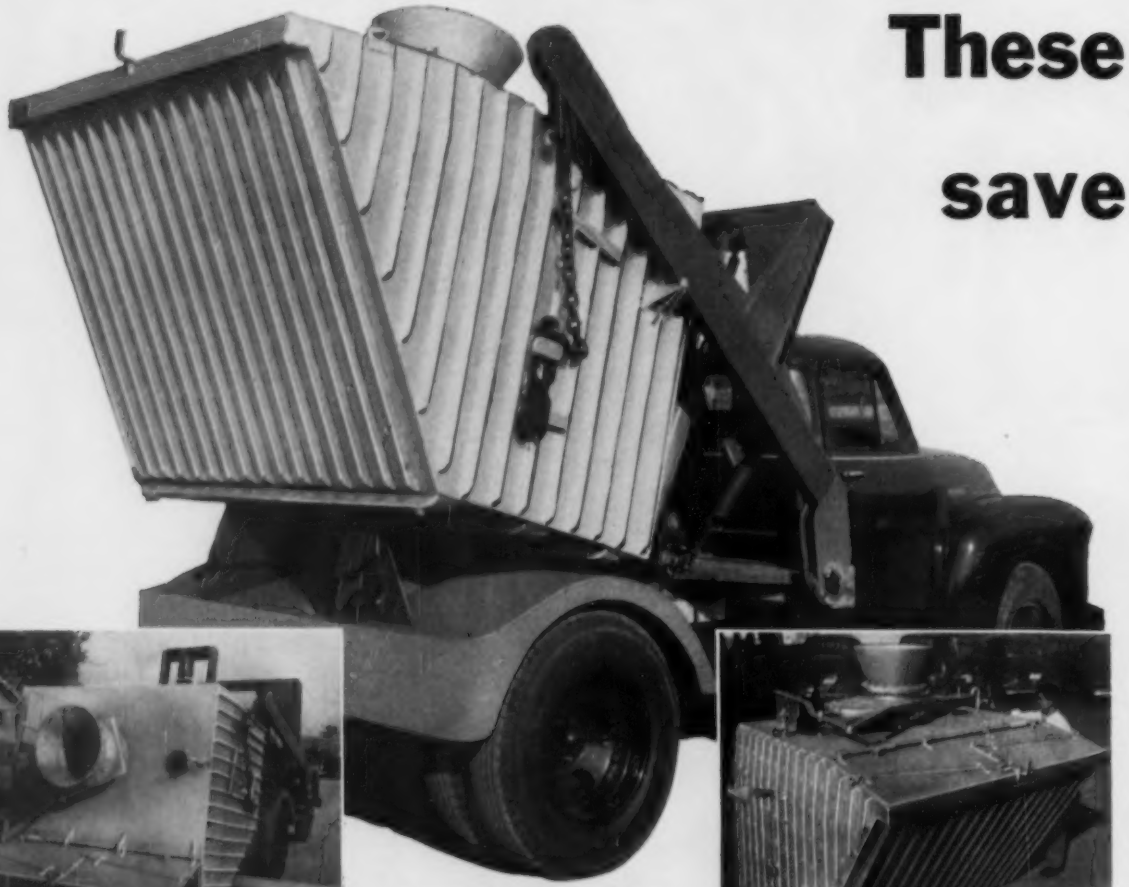
Cincinnati Shapers, Shears and Press Brakes carry a 5 year guarantee on workmanship and material—write for details.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI

These save

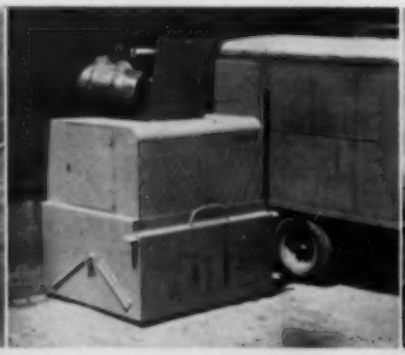


Dempster-Dumpster serving a 6 cu. yd. container with cooling fins for handling a high temperature product.

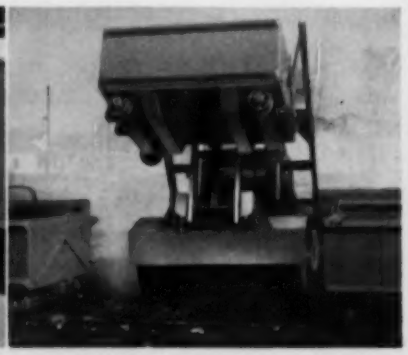
Here are a few of the hundreds of Detachable Containers we have built to solve handling problems of every description. A few others not shown include those with compartments . . . with insert containers . . . fully-insulated . . . lined with lead . . . lined with fire brick . . . with windows and doors . . . with casters . . . flat bottoms and open at one end . . . with teeth . . . with shelves for tools and supplies—and we could describe hundreds more, all served by one Dempster-Dumpster and only one man, the driver.



This 3 cu. yd. Container has skids for fork lift truck transfer.



10 cu. yd. Container widely used for refuse and combustible wastes.



Flanged wheel equipped containers for remote loading.

5176

DEMPSTER

4 manufacturers to $82,000.00 annually handling waste materials!

These four industrial plants expect to save, in labor costs alone, during the first five years service of the Dempster-Dumpster System—

A PLASTICS PLANT: $26,958.00 savings on an investment of $9,523.50 in Dempster-Dumpster equipment. Savings alone pay for equipment in two years.

A CHEMICAL PLANT: $204,076.75 savings on an investment of $40,968.00 in this equipment . . . savings pay for equipment in one year.

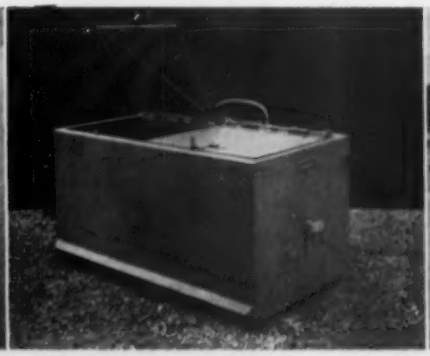
AN AUTOMOTIVE PLANT: $135,000.00 savings on an investment of $19,272.00 . . . savings pay for equipment in 9 months.

A PAPER AND PULP MILL: $43,104.00 savings on an investment of $10,750.00 . . . savings pay for equipment in 1¼ years.

Those are typical examples. Visualize a Dempster-Dumpster, operated by only one man, the driver, serving scores of big steel containers, one after another, in your plant. Containers of many designs and types, handling waste or salvable materials, raw or finished products, fluids including acids, combustibles, dusty materials—anything that can be handled in up to 21 cu. yd. detachable Dempster-Dumpster Containers . . . payloads up to 19 tons. Savings are tremendous! Take advantage of our free engineering service, which determines by fact-finding survey the cost cutting possibilities of this system in your plant. Dempster Brothers, Inc.



600 Gal. stainclad tank with brine cooling channels.



A Container available up to 10 cu. yds. with or without lids for many uses.



A 9 cu. yd. container for handling packaged products.

BROTHERS 4125 N. Knox, Knoxville 17, Tennessee

AIM to save packaging



Bundling cans with Acme Steel Strapping assures 50% faster assembly, better securement, safer shipments. Idea No. S2-4



The F-1 Strapping machine automatically tensions, cuts and welds Steelstrap for faster production line packaging. Idea No. S4-1.



Better securement with steel strapping permits safe, more economical shipment of water heaters. Idea No. U1-1.



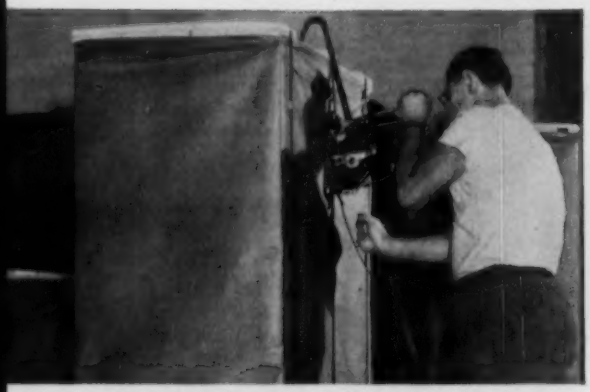
To realize more floor storage space, containers are assembled, and wire stitched as needed. Idea No. W1-6.



Fastening motors to wood bases with steel strapping resulted in a 10% saving in time and labor. Idea No. S7-6.

and shipping costs with these

Acme Steel ideas



Skids of paper are protectively wrapped and securely banded with steel strapping for shipment. Idea No. S3-12.



The Acme Steel Silverstitcher speeds carton assembly, gives in-transit protection of tacks and nails. Idea No. W1-2.

Acme Steel Strapping and Stitching ideas like these are but a few of hundreds that could conceivably work profits for you. They assure faster handling, less material expense, better use of warehouse space, better product protection and safe delivery.

Today, perhaps now, an Acme Idea Man is analyzing the packaging, handling and shipping methods of a company somewhere near you. His training, experience and ability to adapt wire stitching and steel strapping methods to your packaging operation are available to you without obligation. Why don't you get a free analysis now. Your Acme Idea Man will observe present methods, demonstrate Acme Steel equipment and recommend the best systems for you. Call him at your nearest Acme Steel office listed in the classified directory. Or send the coupon below for further information.

ask your *Acme Idea Man to help solve your problems

ACME STEEL PRODUCTS DIVISION

ACME STEEL COMPANY

2840 Archer Avenue, Chicago 8, Illinois



These valuable Wire Stitching, Steel Strapping and Unitizing Books are yours free. Each describes scores of profitable cost cutting, time saving ideas made possible through the use of Acme Steel tools, materials and the ingenuity of an Acme Idea Man. Send today!

ACME STEEL PRODUCTS DIVISION, Dept. EF-125
Acme Steel Company
2840 Archer Avenue, Chicago 8, Illinois

Please send the new Acme Steel ☐ Wire Stitching Catalog ☐ Steel Strapping Catalog ☐ Unitizing Book ☐ Have an Acme Idea Man call

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____

GIANT SIZE!

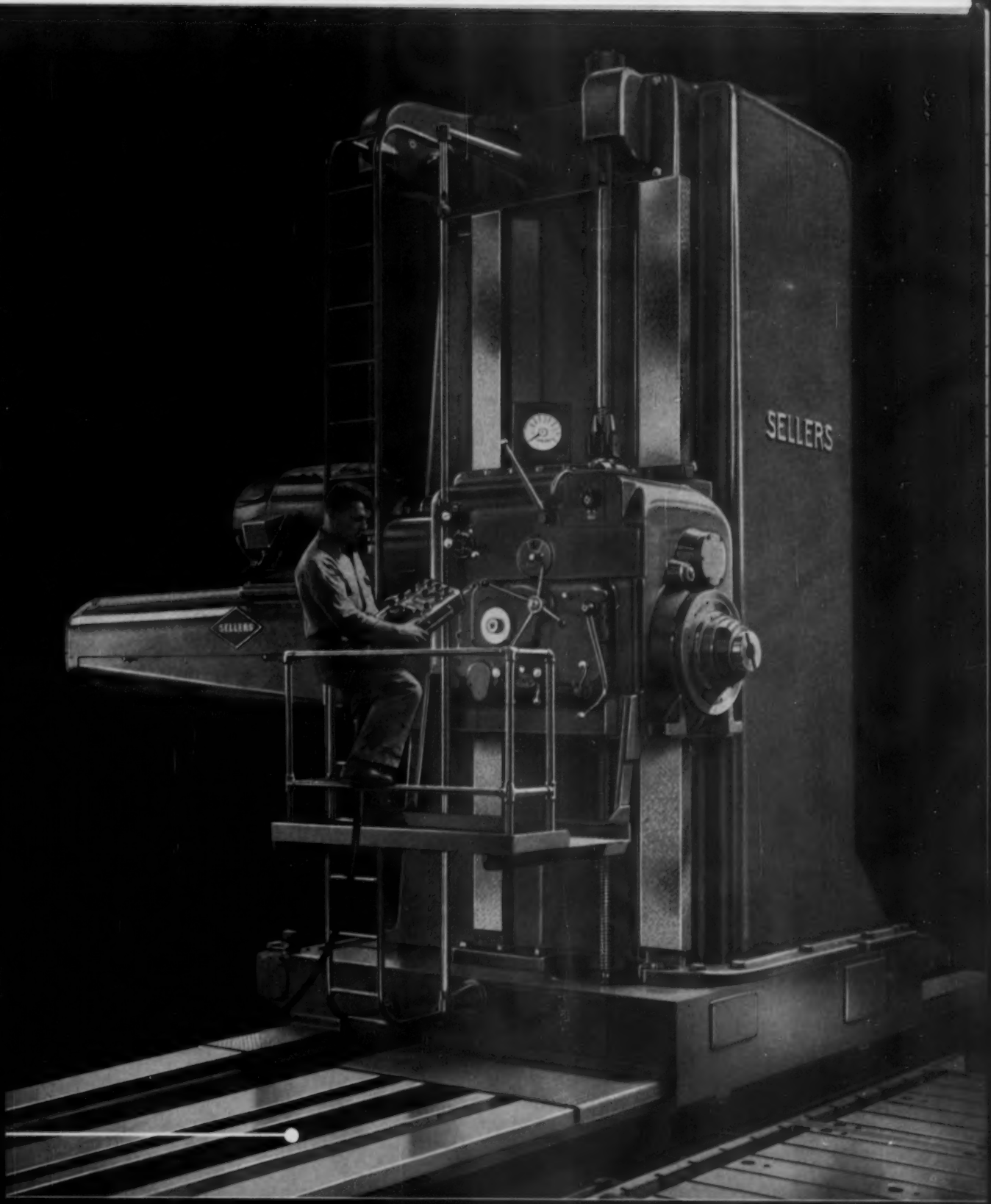
THE GIANT SIZE **Sellers Floor Type Horizontal has:**

A 10 inch diameter spindle
An 8 foot spindle feeding stroke
A runway that measures 9 feet across the ways
A column that measures 4½ feet across its ways
Up to 15 feet of head travel on the column
A 100 horsepower driving motor

It is a big machine for big work, but with its electronic push-button control, it handles like a small one.

CONSOLIDATED MACHINE

A DIVISION OF FARREL-



TOOL COMPANY ROCHESTER 10, NEW YORK

BIRMINGHAM CO., INC.

AJAX announces

New 3-Degree DIHEDRAL COUPLINGS

THE FIRST TRULY

New Ajax 3-D Dihedral Couplings handle up to 3 degrees of misalignment. They are priced at the same level as ordinary gear type couplings!

These new Ajax 3-D Dihedral Couplings now make it possible for design engineers to take advantage of Dihedral performance at low first cost. Precision assembly tolerances can often be relaxed, with savings at the factory and in the field.

The exclusive Ajax Dihedral principle has been proved and approved under the most severe operating conditions.

Features of the new Ajax 3-D Dihedral Coupling include:

3 degree misalignment capacity.

Load is distributed at center of teeth at the point of greatest strength.

More tooth strength is provided under misalignment than is possible with any other tooth shape.

Exclusive Ajax Dihedral tooth design has less clearance than conventional gear type couplings.

No end-of-tooth wear under misalignment.

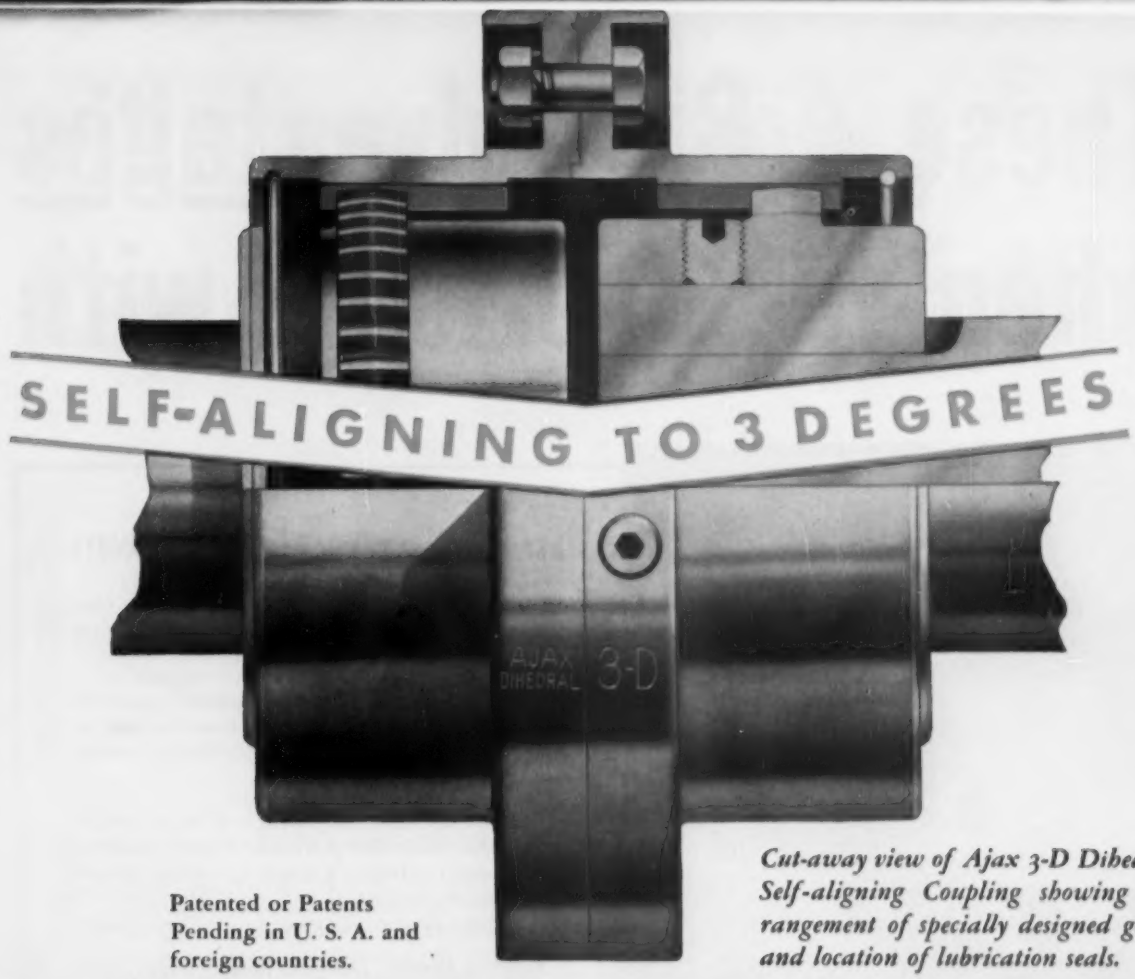
Johns-Manville "Clipper" seals keep lubricant in and foreign matter out.

Compact overall size.

Designed for NEMA motors with standard keys.

Low prices competitive with ordinary gear type couplings.

Available in 5 sizes.
Write for new Catalog No. 60.



Patented or Patents Pending in U. S. A. and foreign countries.

Cut-away view of Ajax 3-D Dihedral Self-aligning Coupling showing arrangement of specially designed gears and location of lubrication seals.

SELF-ALIGNING COUPLING

AT ORDINARY GEAR TYPE PRICES!!

AJAX FLEXIBLE COUPLING CO. INC.

REPRESENTATIVES IN PRINCIPAL CITIES

WESTFIELD, N. Y.

THE WORLD'S MOST COMPLETE LINE OF FLEXIBLE COUPLINGS

These 4 Big Advantages when you fabricate with



REPUBLIC MAKES A VARIETY OF SHEETS

Whatever the requirement, fabricators find Republic Steel Sheets ideal for a wide variety of applications.

Republic Galvanized—with a steel or copper steel base—is highly ductile, easily bent, flanged, or otherwise fabricated. Its tight zinc coating assures years of trouble-free service.

Republic Galvannealed—with a steel or copper steel base—will take paint and lacquer without preliminary treatment. The spelter coating adheres tightly to the base metal, will not flake or peel. It's ideal where product is exposed to severe weather.

Republic Enduro® Stainless Steel—offers more advantages than any other commercial metal. It resists rust and corrosion—is attractive and easy to clean. It's tough, strong, and resists heat. And it can be fabricated on your present equipment. We will be glad to furnish additional facts promptly.

REPUBLIC STEEL

REPUBLIC STEEL CORPORATION
3104 East 45th Street
Cleveland 27, Ohio

Please send additional information on:

- ☐ Republic Electro Paintlok Sheets
- ☐ Republic Galvannealed Sheets
- ☐ Republic Galvanized Sheets
- ☐ Republic Enduro Stainless Steel Sheets

Name _____ Title _____

Company _____

Address _____

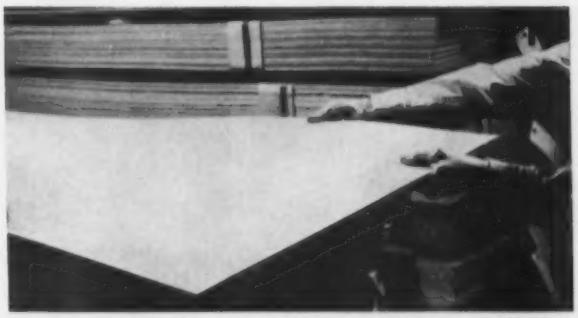
City _____ Zone ____ State _____

E-9054

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

will save you money Republic Electro Paintlok



1 NO STORAGE RUST

Thanks to a combination of electro-galvanizing and a special paint-bonding chemical treatment, Republic Electro Paintlok sheets may be stored for long periods of time under approved warehousing conditions without damage due to rusting. An adequate inventory can be maintained to avoid costly shutdowns during peak periods. And you save in reclamation work or actual loss from unusable sheets.



2 MINIMUM CLEANING COSTS

Degreasing Republic Electro Paintlok sheets is unnecessary when no drawing compound is used. They come in prime condition for painting. Only the removal of fingermarks, fabricating oils and any dirt acquired during warehousing and fabrication is necessary. Surfaces are pre-conditioned. No pre-etching is required. And because they are cleaner to handle, employees like to work with them.



3 LOWER PRODUCTION COSTS

The ability of Republic Electro Paintlok's zinc coating to remain absolutely tight during drawing, bending, rolling, shearing and punching operations—with no fracturing, no cracking, no peeling or flaking—speeds production and lowers costs. Uniformity of gage—plus increased die life due to the lubricating quality of the coating—make further economies possible. Ask any of our customers about these important advantages.

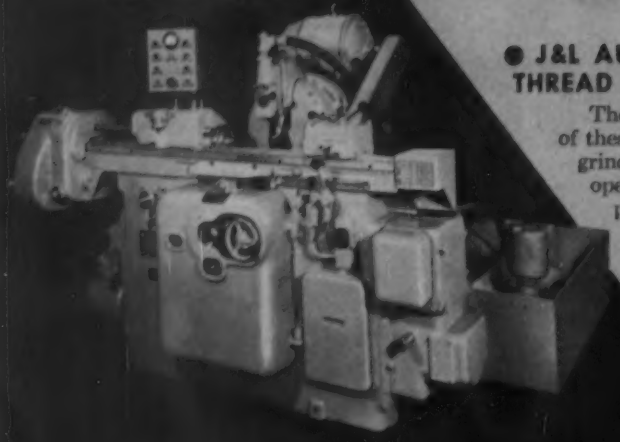


4 MAXIMUM PAINT ADHERENCE

Republic Electro Paintlok is zinc-plated and chemically treated to take paints, lacquers, synthetic enamels—and hold them for years through hard service and severe exposure. The inert, finely crystalline, nonmetallic phosphate coating is highly absorbent in character, grips the paint with thousands of tiny "teeth" that never let go.

To save money and produce painted or enameled steel products that look better longer—it will pay you to get the complete facts on Republic Electro Paintlok.

Looking for higher production



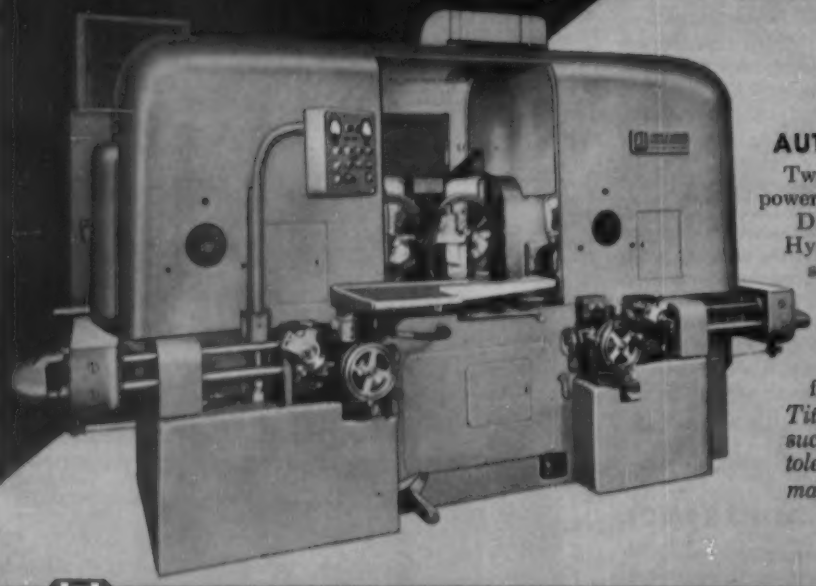
● J&L AUTOMATIC THREAD GRINDER

The self-trueing, self-sizing mechanism of these machines has made thread grinding a practical, profitable production operation. They can be arranged for plunge grinding single or multiple grooves or contours, and for grinding threads with multi-rib wheels, either diamond or crush dressed.



MODEL E AUTOMATIC FORM GRINDER ●

Completely automatic cycle. High speed approach, wheel feed spark-out and withdrawal are positively controlled through simple cam action, ensuring constant, uniform operation under all conditions.



● MODEL D DUO WHEEL AUTOMATIC FORM GRINDER

Two 20″ dia. grinding wheels, powered by 20 HP A.C. motors, or D.C. with rheostat control. Hydraulically operated vertical slide, mounts work holding fixtures. The stroke may be adjusted to accommodate a variety of work. These models are equipped with full vapor control.

Titanium alloys have been successfully ground to tolerances with this machine.

J&L JONES & LAMSON MACHINE COMPANY

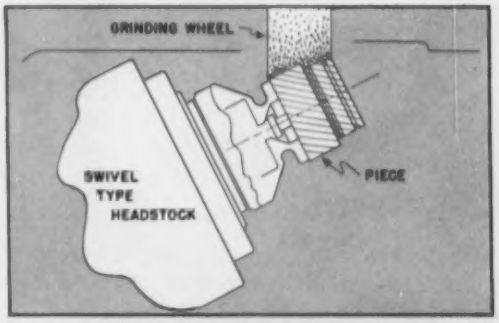
Jones & Lamson offers you a choice of methods for acquiring modern, profit-producing J&L equipment. In addition to outright purchase, J&L makes available several different "Pay-from-Productivity" plans at interest rates of 3¼ % and lower (add-on), and a broad variety of leasing plans.

Send today for complete information. Simply fill in the coupon, *clip it to your letterhead and mail.*

and greater accuracy?

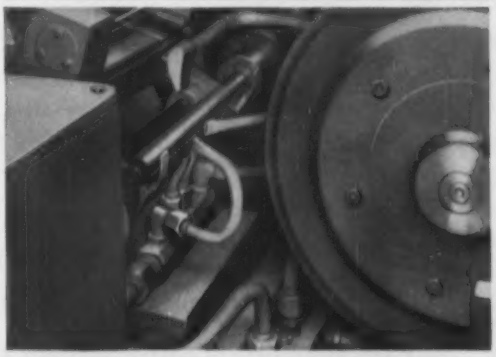
...why not GRIND IT?

Newly developed materials, plus the constant demand for higher production and greater accuracy, are causing industry to step up its search for better methods of producing a great variety of work. In many instances it is found that Automatic Thread and Form Grinders can perform a great many different and difficult production jobs with greater speed and precision than was ever possible with the use of conventional equipment.



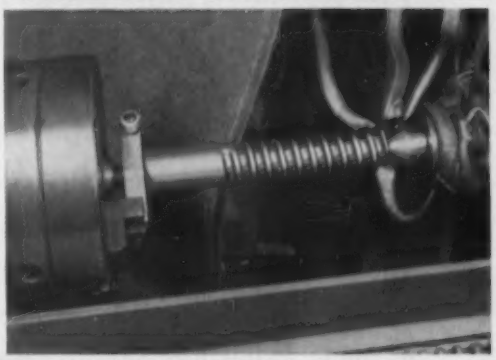
ANGLE GRINDING

This piece is held on an angle by an expanding air-operated arbor in the swivel type headstock of the J&L Model E. Four diam. are ground in one pass with a single wheel.



AUTOMATIC HANDLING

J&L Grinders are readily equipped with automatic handling for maximum output along production lines. This machine has a magazine feed for automatic loading and unloading of parts to be plunge ground for the automotive industry.



STOCK REMOVAL

J&L Wheel Spindles — grease packed for life, allow heavy stock removal such as on this worm (dia. 1.141″, stock removed — .1235″). Plunge ground from the solid — one cut. Increased production 160% over previous method.

P.S. On the basis of increased quality and more production per labor hour, we invite the opportunity to improve upon your existing methods.

MACHINE TOOL DIVISION

UNIVERSAL TURRET LATHES • FAY AUTOMATIC LATHES • AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES • AUTOMATIC THREAD & FORM GRINDERS • OPTICAL COMPARATORS AUTOMATIC OPENING THREADING DIES & CHASERS

511 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

JONES & LAMSON MACHINE COMPANY
511 Clinton St., Dept. 710, Springfield, Vt., U. S. A.

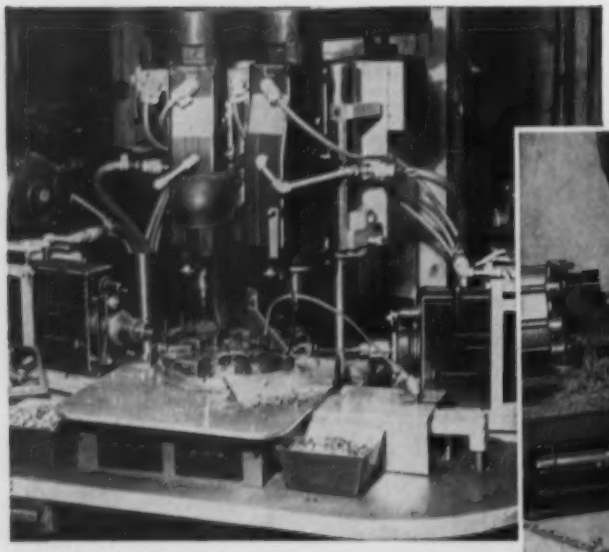
Please send me the J&L Machine Tool Replacement Information Kit.

Name.....

Title.....

How You Can Use Bellows

...TO CUT



This tool-room-built special purpose machine automatically drills four holes in brass pawls for fishing reels. Built around Bellows Work Units it cost less than 1/5 the price of a standard machine to do the same job—and is producing at cost saving of 90% per part.



A production increase of 200% in milling both ends of steel anchor pins resulted when Bellows Work Units were employed to clamp the work pieces and feed the table.

Bellows work units are precision auxiliary power devices, which can do most operations formerly done by hand, foot, or by means of mechanical gearing or cams.

Each work unit is designed to do a specific operation and is engineered to work alone or in conjunction with other work units. They can be installed on a wide range of standard machines, or with standard machine parts can be readily built into inexpensive, tool-room-built special purpose machines.

Engineering assistance in the application of Bellows work units to your manufacturing processes is available from more than 100 Bellows Field Engineers. Thoroughly experienced in manufacturing processes, they have at their fingertips a background of practical and technical knowledge that can prove of real help to you in finding new ways to cut production costs. A phone call to any of the Bellows offices will bring you full information, without cost or obligation.

1322-A

Air-Powered Work Units

PRODUCTION COSTS



In this drilling and tapping operation, two Bellows Drill Press feeds are interlocked with a Bellows Rotary Feed Table. Parts are fed to the cutting tools quickly, safely, accurately. Each tool is fed to the work under a perfectly controlled feeding rate. Cost cut from 33-6/10 cents to 7-3/10 cents per part.



Here three Bellows Air Motors are interlocked electrically to assemble a magneto coil and core. One Air Motor presses coil and core together. One bends a clip to hold assembly fast. The third feeds fixture to electric screwdriver which secures the ground wire. Production gain over the previous method: 260%.

One or more Bellows Field Engineers are at your service in any of the industrial areas below. They are listed in their local phone directories under "The Bellows Co."

AKRON, OHIO
ANN ARBOR, MICH.
ATLANTA, GEORGIA
BALTIMORE, MD.
BIRMINGHAM, ALA.
BOSTON, MASS.
BRIDGEPORT, CONN.
BROOKLYN, N. Y.
BUFFALO, N. Y.
CANTON, OHIO
CEDAR RAPIDS, IOWA
CHEBOYGAN, MICH.
CHICAGO, ILL.
CINCINNATI, OHIO
CLEVELAND, OHIO
COLUMBUS, OHIO
CONCORD, N. H.
DAVENPORT, IOWA
DAYTON, OHIO
DECATUR, ILL.
DENVER, COLORADO
DETROIT, MICH.
ERIE, PA.
EVANSVILLE, IND.
FITCHBURG, MASS.
FT. WAYNE, IND.
GRAND RAPIDS, MICH.
GREENSBORO, N. C.
HARTFORD, CONN.
HOUSTON, TEXAS
INDIANAPOLIS, IND.
JACKSON, MICH.
JACKSONVILLE, FLA.
KALAMAZOO, MICH.
KANSAS CITY, MO.
KNOXVILLE, TENN.
LOS ANGELES, CALIF.
LOUISVILLE, KY.
MEMPHIS, TENN.
MIAMI, FLORIDA
MILWAUKEE, WISC.
MT. VERNON, N. Y.
NEWARK, N. J.
NEW HAVEN, CONN.
NEW YORK, N. Y.
NORWALK, OHIO
OAKLAND, CALIF.
PHILADELPHIA, PA.
PHOENIX, ARIZONA
PITTSBURGH, PA.
PORTLAND, ORE.
PROVIDENCE, R. I.
READING, PA.
RICHMOND, VA.
ROCHESTER, N. Y.
ROCKFORD, ILL.
ST. LOUIS, MO.
ST. PAUL, MINN.
SAGINAW, MICH.
SAN DIEGO, CALIF.
SAN FRANCISCO, CALIF.
SCHENECTADY, N. Y.
SEATTLE, WASHINGTON
SOUTH BEND, IND.
SPRINGFIELD, MASS.
SYRACUSE, N. Y.
TAMPA, FLA.
TOLEDO, OHIO
TRENTON, N. J.
WHEELING, W. VA.
WILKES-BARRE, PA.
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CANADA

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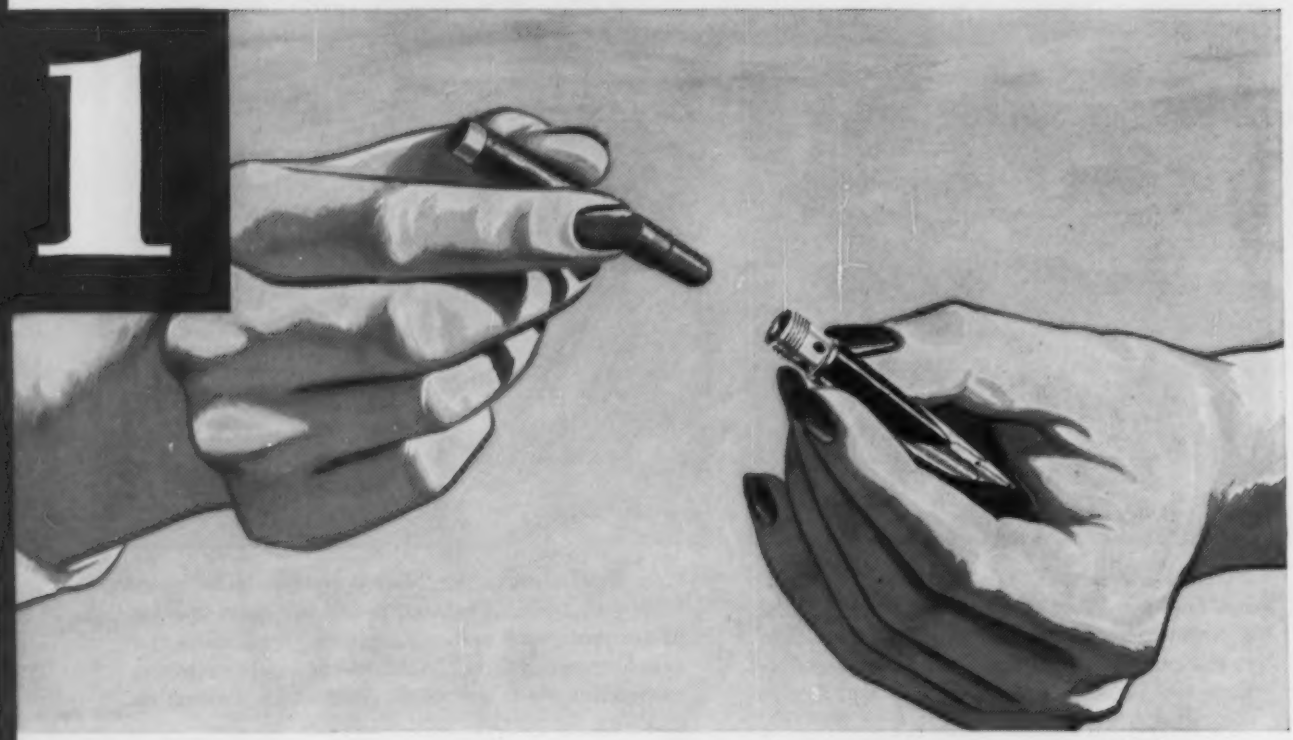
The Bellows Co. of California
LOS ANGELES, CALIF.

Bellows Pneumatic Devices of Canada, Ltd.
TORONTO, CANADA

The Bellows Co.
AKRON 9, OHIO

1322-A

This company made a better product with the help of Alcoa's Development Division



Waterman Pen Company makes a better fountain pen

Engineers of the Waterman Pen Company decided to banish the ink bottle. An ink-filled cartridge seemed to be the way around old-fashioned "fill-and-spill" methods. Their designs called for a polyethylene capsule, filled with liquid ink and capped at one end. Question was, how to cap the end. Many suppliers were consulted—most said it couldn't be done. Then an Alcoa sales engineer suggested an aluminum cap.

Specialists at Alcoa's Richmond, Indiana, closure division designed a 6-mm aluminum cap with a polyethylene liner. The plan was to heat-seal the strong, corrosion-resistant aluminum cap to the polyethylene cartridge at the time of filling. Alcoa engineers then worked with the packaging machinery manufacturer to develop a way to fill, cap and heat-seal the cartridge in one operation. The result you can see in any fine store today. The new Waterman C/F pen can be filled in seconds without fuss or muss.

Experience gained from thousands of such projects is available to you through Alcoa's Development Division. Making your *product* perform better in aluminum could be our *next* job.

DEVELOPMENT DIVISION
ALUMINUM COMPANY OF AMERICA

This company gets strong marketing support with the help of Alcoa's Labeling Program



Grumman adopts the Alcoa label

Signing the Alcoa Labeling Agreement enabled Grumman to use the powerful Alcoa label with the famous Grumman name. The combination tells distributors, dealers, and customers that here is a product with an aluminum pedigree. Thus Grumman shares in the millions of impressions of the Alcoa label that will appear in national magazines and on television in 1955.

The accumulated recognition of the Alcoa name, which for 67 years has stood for the finest in aluminum, is available to Alcoa mill product customers with their use of the Alcoa label. Complete plans and detailed advantages of its use are available from your local Alcoa sales engineer. The Alcoa office nearest you is listed under "Aluminum" in your classified phone book.

Your Guide to Aluminum Value



"Operations Kingsbury" includes straddle milling two

Front and rear hangers for an automobile front spring assembly are machined on these two Kingsburys. Design of each part requires work from three directions: top, front *and back*. This work is accomplished in one cycle without rotating the work-holding fixtures.

These two machines illustrate several important advantages, appreciated by design engineers and production men.

For example: high production at low cost per part. The following table tells this story:

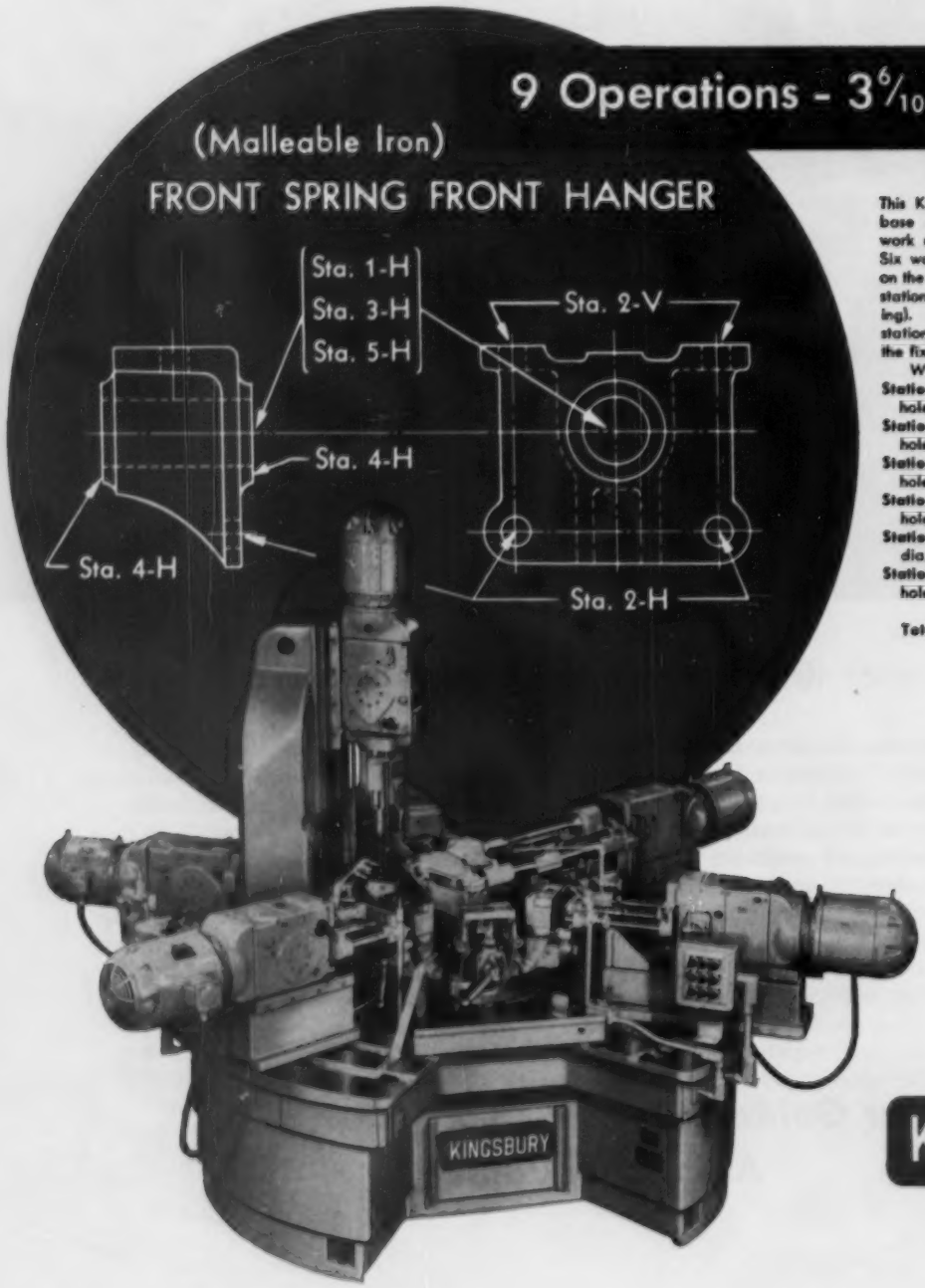
Part	Number of Operations	Parts per hour, gross	Cost per part
REAR HANGER (at right)	10	240	4-6/10c .
FRONT HANGER (at left)	9	265	3-6/10c

REAR HANGER: Two milling operations for only 1c.

9 Operations - $3\frac{6}{10}$¢ per part

(Malleable Iron)

FRONT SPRING FRONT HANGER



This Kingsbury machine has a 96-inch base and 26-inch index table. Six work units are mounted on the base. Six work-holding fixtures are mounted on the table, which indexes through six-stations (one for loading and unloading). All work is performed at five stations, without removing the part from the fixture.

Work	Operations
Station 1-H: Core drill .853/.855 hole undersize	1
Station 2-H: Drill .375 thru — two holes	2
Station 2-V: Drill .375 thru — two holes	2
Station 3-H: Rough ream .853/.855 hole undersize	1
Station 4-H: Spotface bosses 1.25 dia., front and rear	2
Station 5-H: Finish ream .853/.855 hole thru to size	1
Total Operations	9

KINGSBURY

bosses for approximately one cent

There's nothing particularly difficult about any of these operations — until we consider the production output and low cost per part. Even at 80% efficiency, delivery of a finished part such as these *every* 19 *seconds* or less, is profitable business for the manufacturer.

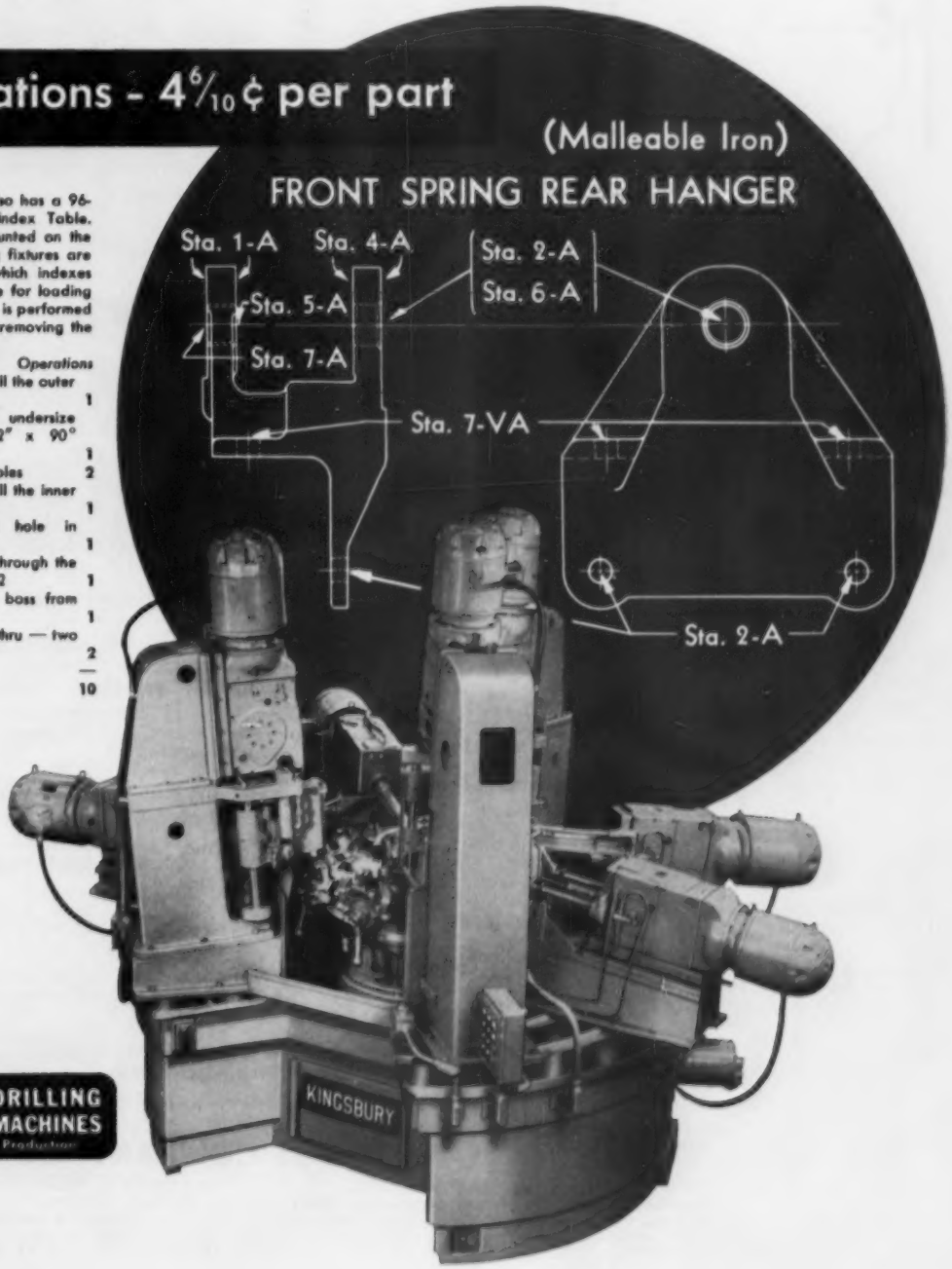
Today, the design engineer has greater freedom than ever before. He can now design parts with less worry about *manufacturing* operations . . . because, here at Kingsbury we know what operations a Kingsbury *can* do. So, if we feel that a Kingsbury machine will justify itself in your production schedule, you can plan on high production, low cost per part, and uniform quality.

Kingsbury Machine Tool Corporation
111 Laurel Street
Keene, New Hampshire

10 Operations - $4^{6}/_{10}$¢ per part

(Malleable Iron)

FRONT SPRING REAR HANGER



The Kingsbury machine also has a 96-inch base, with 30-inch Index Table. Seven work units are mounted on the base. Eight work-holding fixtures are mounted on the table, which indexes through eight stations (one for loading and unloading). All work is performed at seven stations, without removing the part from the fixture.

Work	Operations
Station 1-A: Straddle-mill the outer boss	1
Station 2-A: Drill .656 undersize and countersink 23/32" x 90° one hole in outer boss	1
Drill .375 thru — two holes	2
Station 4-A: Straddle-mill the inner boss	1
Station 5-A: Drill .562 hole in inner boss	1
Station 6-A: Line ream through the two holes, .656 and .562	1
Station 7-A: Tap inner boss from rear: ⅝ — 16 Tap	1
Station 7-VA: Drill .375 thru — two holes	2
Total Operations	10

AUTOMATIC DRILLING AND TAPPING MACHINES
for Low Cost High Production

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Youngstown has 28 district sales offices conveniently located throughout the nation to serve you quickly. They are staffed with men who know the steel business thoroughly and are qualified to help you with your steel requirements. You can get quick service whether you write, wire or phone your nearby Youngstown District Sales Office.

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The most critical period in the life of a forging die is its first few hours of use. Longer life is assured if adequate and proper lubrication is available during the break-in period.

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use 'dag' dry films for trouble free lubrication



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Deep knurling for extra safety, in high strength alloy steel spindles and special adhesive . . . the abrasive heads stay on spindles.

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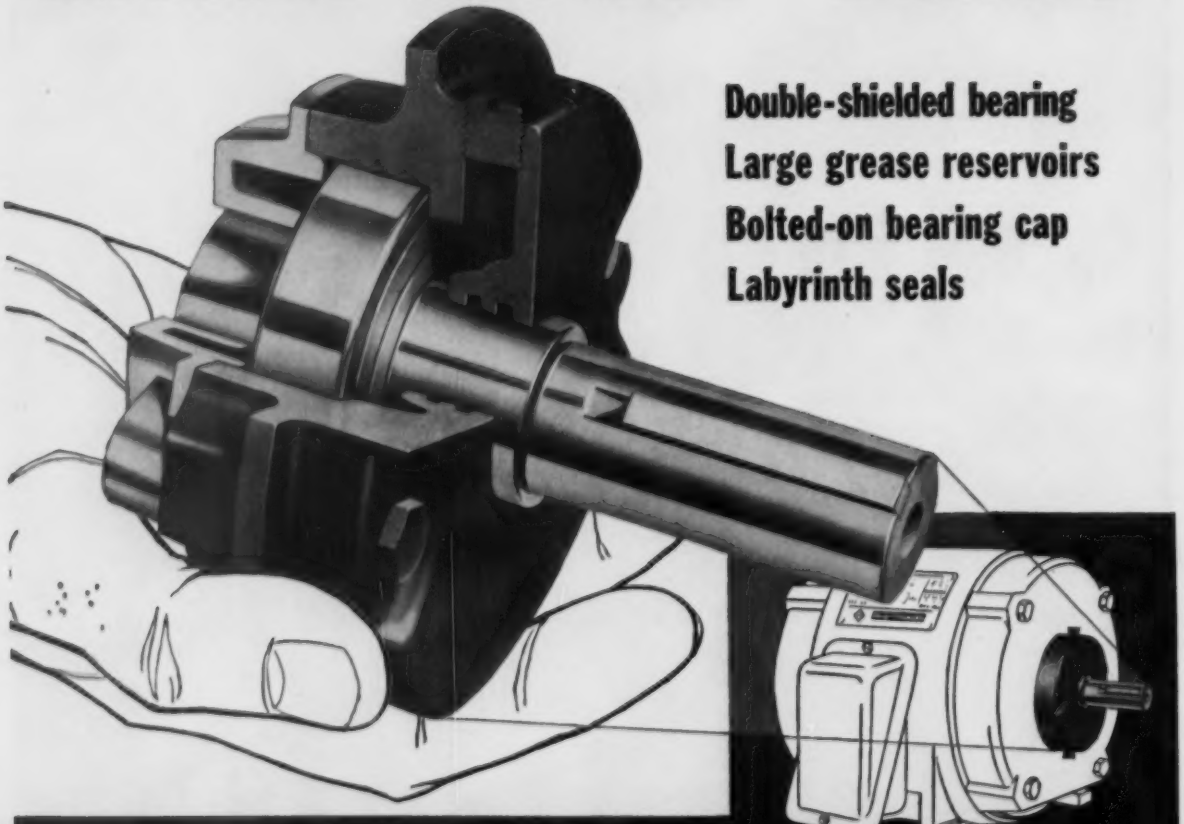
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Here Is Extra Motor Value



Double-shielded bearing
Large grease reservoirs
Bolted-on bearing cap
Labyrinth seals

This Allis-Chalmers Bearing Design Gives More for Your Motor Dollar

You can lubricate these bearings without dismantling motor. Pipe-tapped holes in the bearing housings at two points provide means for inserting new grease, flushing out old grease and relieving pressure during re-greasing.

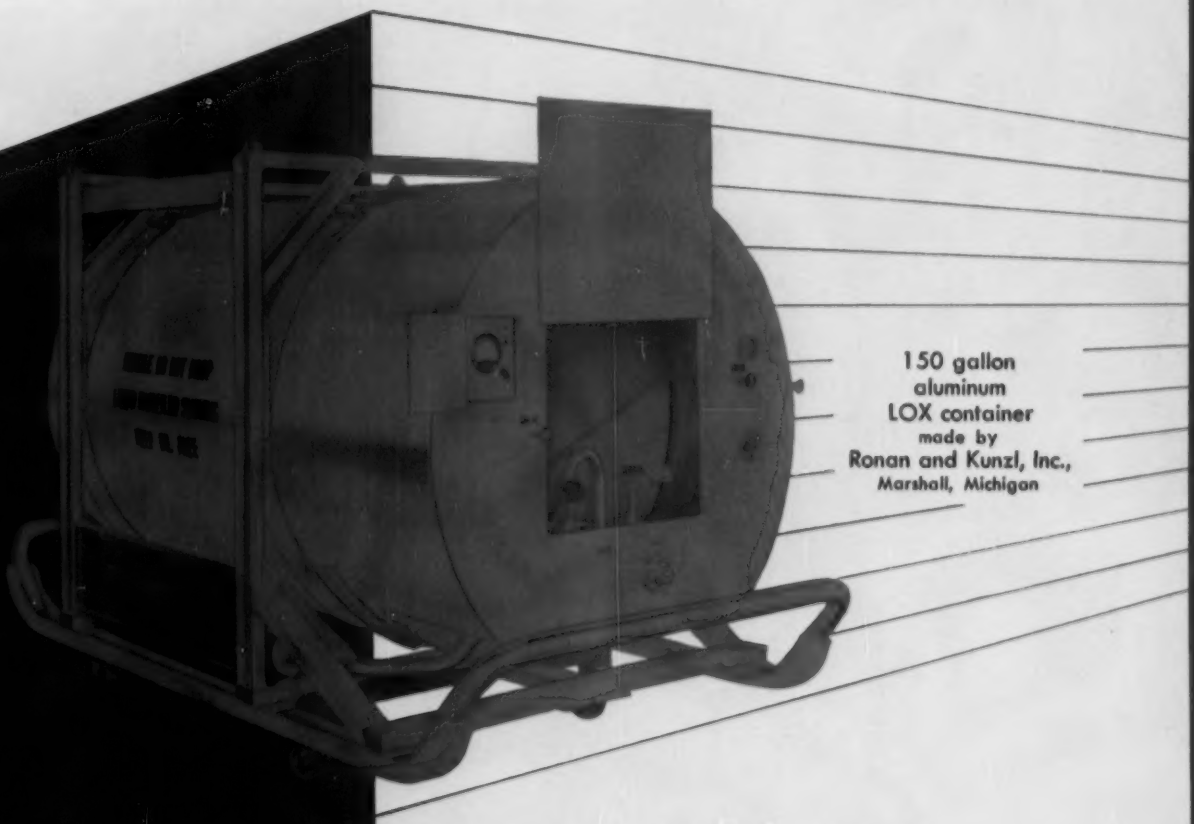
The bearing cap is held tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Look for the extra bolts on the end housing . . . the sign of greater value. Ask your Allis-Chalmers representative or Authorized Distributor to show you a cutaway section of this maintenance-cutting design. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B6210.

A-4617

ALLIS-CHALMERS



150 gallon
aluminum
LOX container
made by
Ronan and Kunzl, Inc.,
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50 Micron Vacuum Plus 50 psi Pressure Test Strength of Welded Aluminum in Liquid Oxygen Tank

To retain oxygen in its liquid state Ronan and Kunzl LOX tanks are designed like large vacuum bottles using the Dewar principle. A double-walled aluminum container is heliarc-welded to successfully sustain a vacuum below 50 microns plus inner tank pressures up to 50 psi. Internal pressure is the result of a method used to discharge the liquid oxygen. The 150 gallon LOX container, illustrated, as well as 50 and 500 gallon models are designed to Air Force specifications and made of Reynolds Aluminum.

The weldability of aluminum was just one factor in its selection for the liquid oxygen containers. Aluminum was also selected because it is lightweight and because it remains ductile at −300 F. Only a metal with aluminum's ductility could withstand the thermal shock to which these containers are exposed. And only aluminum met the rigid strength per pound requirements of the Air Force.

In addition to tank elements, the framework and skids of LOX containers are also made of aluminum. Alloy selection for the various parts was based on recommendations of Reynolds Engineering Service.

Here, as in so many other high performance applications, light, strong rustfree aluminum does the job better. See the next page for information on how you can design and fabricate aluminum more efficiently and profitably.

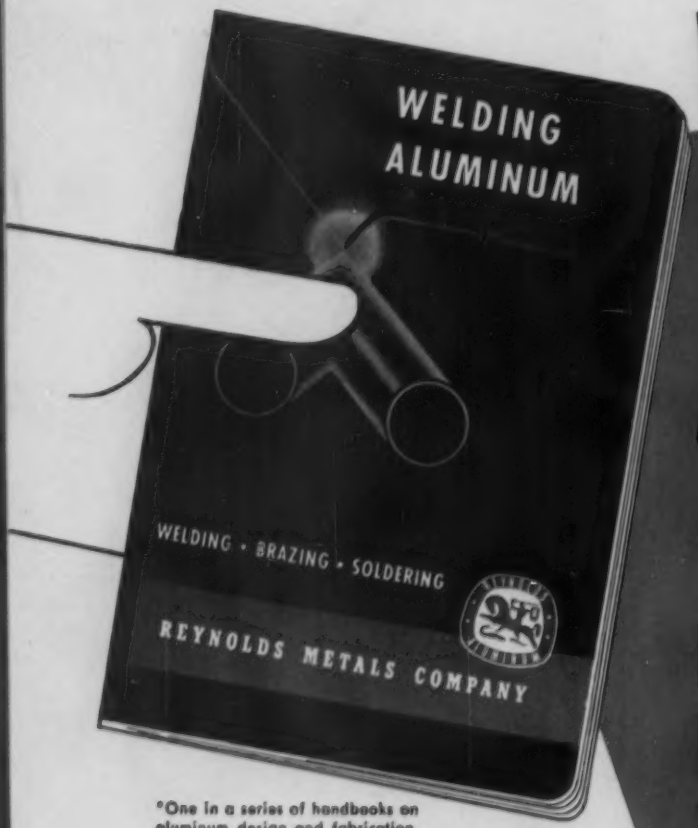
This seal is a symbol of quality aluminum to millions. Find out how it can add sales appeal to your products.

Designed by REYNOLDS ALUMINUM

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REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



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cuts costs—reduces weight

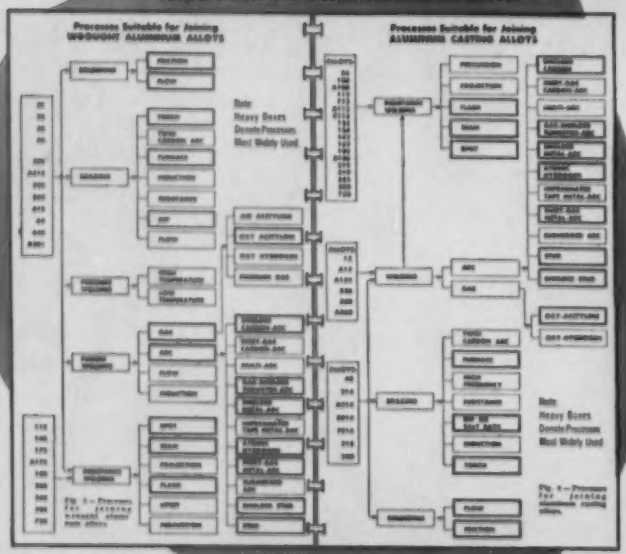
ALUMINUM

cuts costs—reduces weight

186 PAGE REYNOLDS HANDBOOK* Tells You How

*One in a series of handbooks on aluminum design and fabrication.

These are typical pages showing treatment of subject matter in this comprehensive handbook.



Anyone familiar with welding other metals will find all he needs to know about welding aluminum in this new 186-page handbook.

This is a new edition with information on 34 processes for welding, brazing and soldering aluminum and its alloys. It thoroughly discusses the various methods and techniques and recommends the processes best suited to each design requirement.

For assistance with your problems in aluminum fabrication you can request the direct consultation of men from Reynolds Engineering Service. They will gladly work with your own designers, engineers and production men on your particular aluminum applications. For your free copy of "Welding Aluminum" and a complete index of Reynolds technical literature, write on business letterhead to *Reynolds Metals Company, P.O. Box 1800-JK, Louisville 1, Kentucky.*

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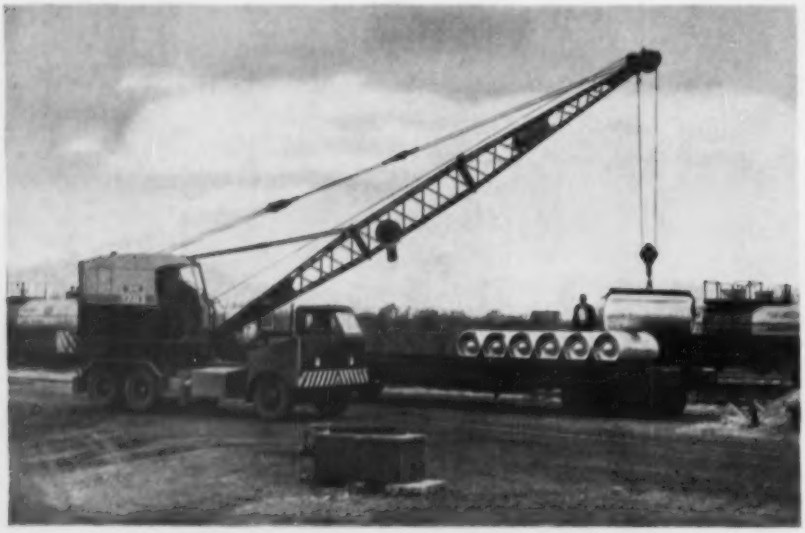
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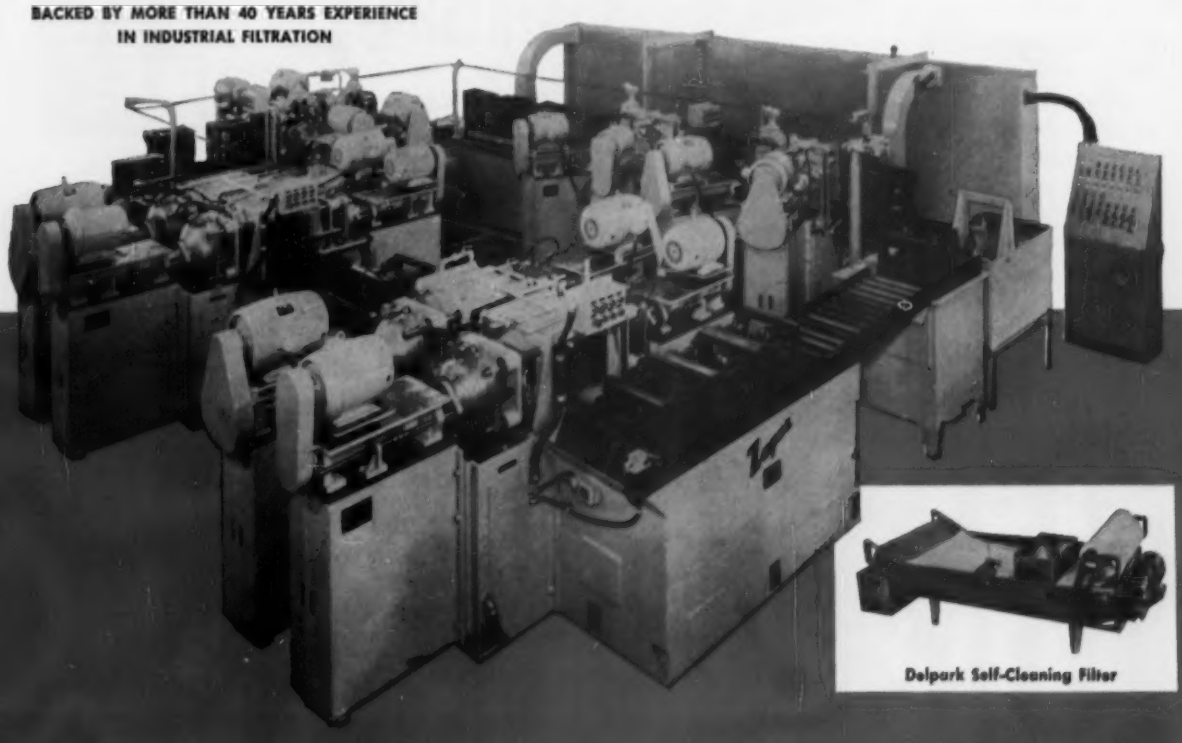
These Zagar pallet-type transfer machines at IBM perform numerous drilling operations on aluminum frames for the famous IBM typewriters.

Here is a fine example of Automation . . . and backing up this unit is automation in filtration. You won't see it in the picture, but . . . Delpark filtration cleans coolant from the 206 drill spindles. Greater accuracy of drill hole size, longer drill life, more efficient tool operation are but a few of the major savings gained through Delpark filtration. Delpark is one reason why up to 144 parts per hour are handled on this unit with but two operators. Credit IBM and Zagar tool engineering for foresight . . . credit IBM tool service for production know-how . . . credit Delpark for filtration as modern as today's automation.

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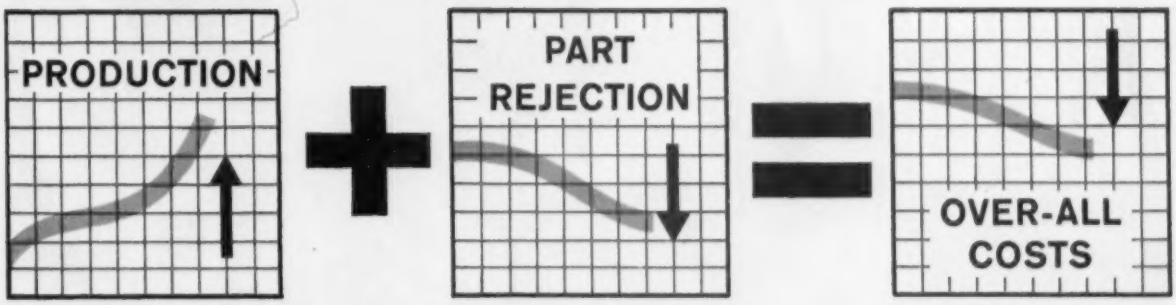
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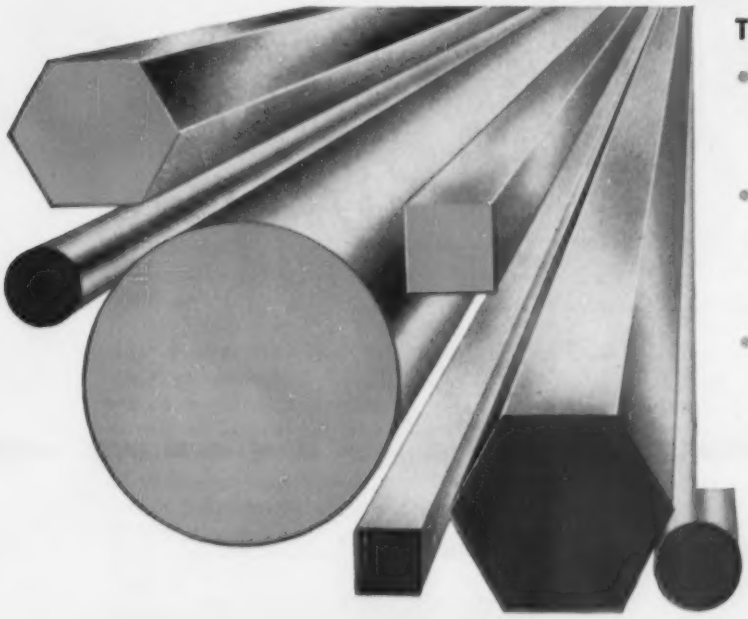
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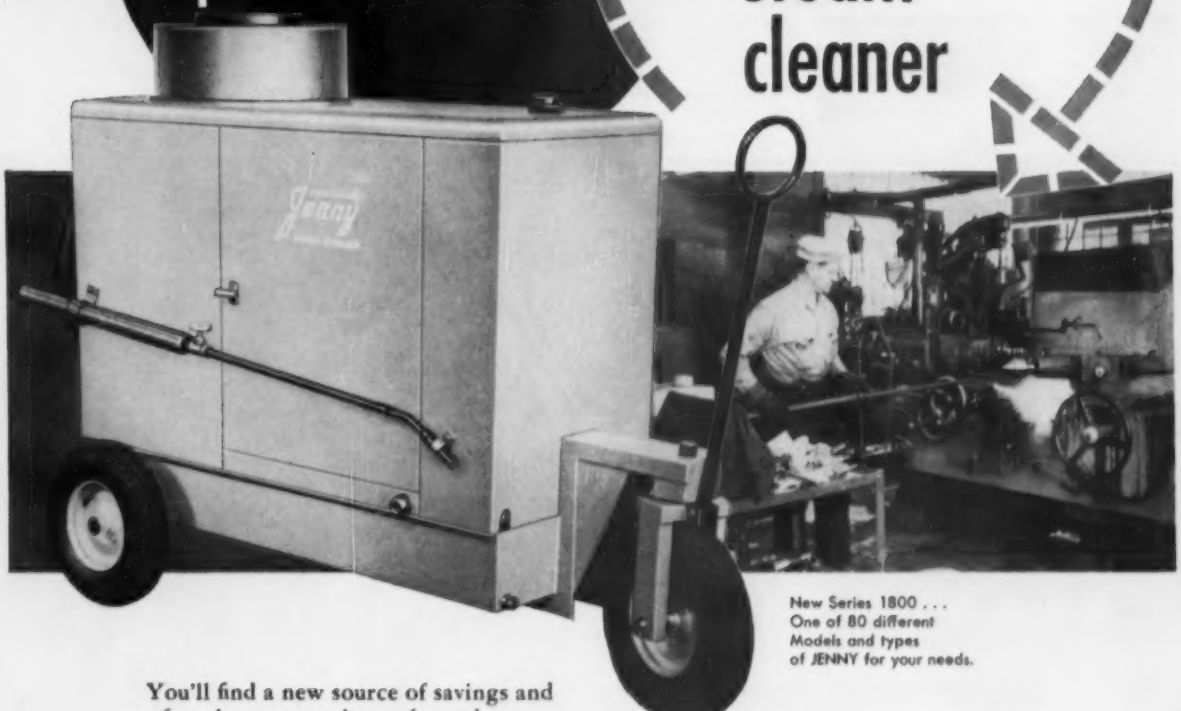


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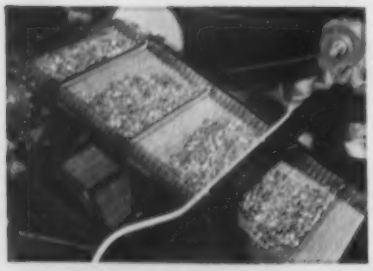
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Cleveland 16, Ohio

This advertisement sponsored by these Companies which are members of the Metal Treating Institute.

METAL TREATING INSTITUTE

271 NORTH AVENUE
NEW ROCHELLE, NEW YORK

can YOUR production equipment KEEP UP WITH THIS MARKET?



★ By 1965, the experts predict there will be 80 million automobiles in existence, as compared to some 50 million now.

For that traffic load, more than 50 billion dollars will be needed to rebuild the 3,350,000 miles of existing roads and to build new super highways.

Each million dollars of highways requires between 420 and 450 tons of steel. Each automobile averages about 3,500 pounds of steel, plus many pounds of copper, brass, aluminum, rubber and plastic.

Will you lose out competitively on this big market on poor quality of product or slow production equipment? Good equipment brings down production costs and improves product quality.



Aetna-Standard designs and builds equipment for producing, processing and fabricating steel, copper, brass, aluminum, rubber and plastic. Here is one example—an 80" Sheet Side Trimming and Shearing Line at the Fairless Works, U. S. Steel Corporation. Other Aetna major product lines include: Pipe Mills (Seamless and Butt Weld); Continuous Coating Lines; Rolls; Drawbenches; Machinery for Rubber and Plastic.

SUBSIDIARY and ASSOCIATED COMPANIES

The Aetna-Standard Engineering of Canada, Ltd., Toronto, Ontario, Canada.
The Head Wrightson Machine Company, Ltd., Middlesbrough, Eng.
Societe de Constructions de Montbard, Montbard, France.
Demag Aktiengesellschaft, Duisburg, Germany.
Compagnia Italiana Forme Acciaio, Milano, Italy.
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Engineering and Development Corporation of the Philippines, Manila, P. I.
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M. Castellvi, Inc., New York, N. Y.
Standard Engineering Co., Ellwood City, Pa.
Trans-World Traders, Inc., Pittsburgh, Pa.

Designers and Builders to the Steel, Copper, Brass, Aluminum, Rubber, Plastic and Chemical Industries

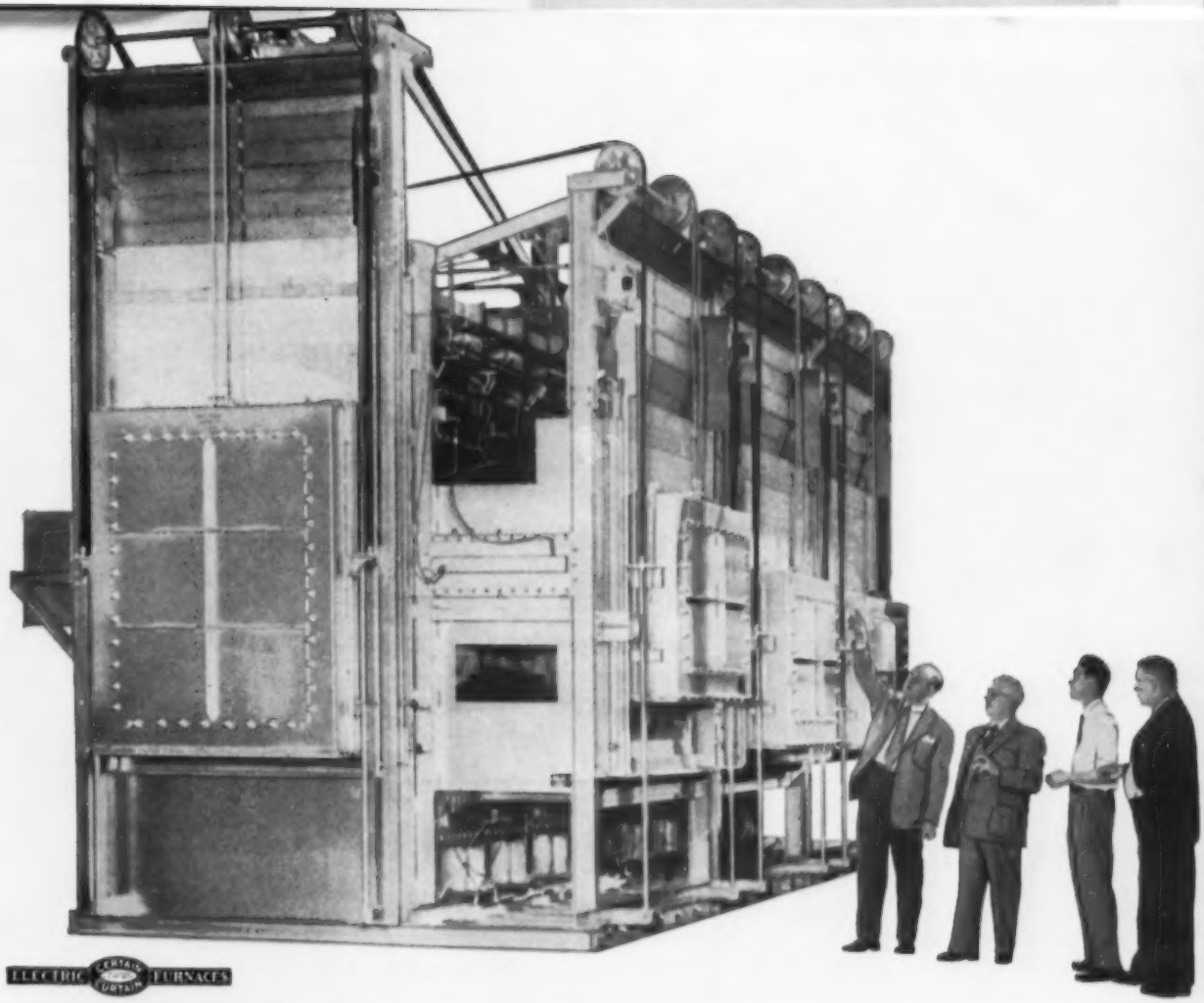
THE AETNA-STANDARD ENGINEERING COMPANY · PITTSBURGH, PA.

Aetna-Standard

PLANTS IN WARREN, OHIO · ELLWOOD CITY, PENNSYLVANIA

GOOD EQUIPMENT BRINGS DOWN PRODUCTION COSTS

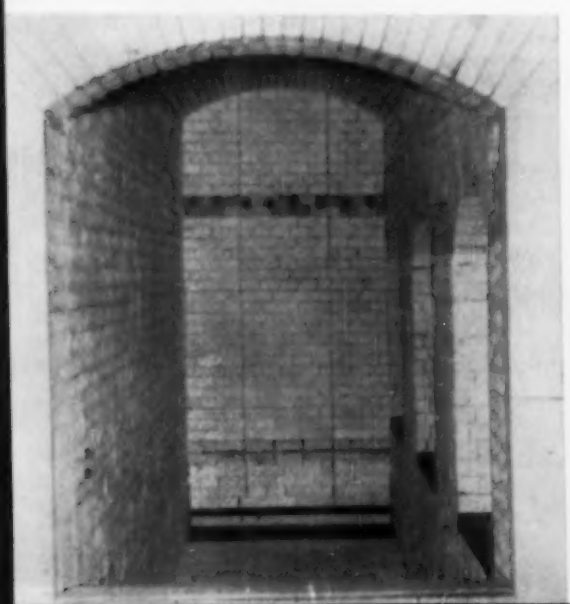

beyond the sonic wall...
thermal barriers
with, as yet,
unanswered
challenges!
• With each "boom" of a jet crashing through the sonic barrier, aircraft engineers give the sleeping dragon's tail another twist. Out there in space—which mankind has dedicated itself to conquer, lies the ugly, wallowing form of the next big challenge—temperature!
We manufacture many things for our air arm . . . precision gear assemblies for accessory drive units, actuators, transmissions, computers and controls . . . complete components such as bomb hoists, gun turrets, radar tracking and scanning assemblies, hydraulic actuators. But we're also hard at work on top secret equipment which, in the near future, will help arm our "flying St. Georges" as they slay the fiery dragon.
Challenges like these are our long suit. We've helped solve tough problems for years . . . and will keep on assisting wherever possible. Make your development and production problems our problems. Just write, wire or call: The Steel Products Engineering Company, Springfield, Ohio.
SPECO
THE STEEL PRODUCTS ENGINEERING CO.
ENGINEERS AND MANUFACTURERS • SPRINGFIELD, OHIO



SUPER REFRACTORIES REDUCE WEIGHT AND GIVE FAST HEAT-UP OF

world's largest electric steel forging furnace

Interior of heating chamber. It will accommodate 10,000-lb. steel forgings. The GLOBAR heating units and the CARBOFRAX hearth and piers had not yet been installed when this photo was taken.



The world's largest controlled atmosphere electric steel forging furnace was recently shipped from the Cranston, R. I. plant of C. I. Hayes, Inc. The big furnace is 17 feet high, 13 feet wide and 25 feet long over-all. It uses 45 GLOBAR® silicon carbide heating elements drawing 600 kilowatts to provide operating temperatures in the 2200°-to-2400°F. range. It will be used to supply billets up to 16 feet in length and 10,000 lbs. in weight for hot forging on a 50,000-ton press, one of the largest in existence.

C. I. Hayes used a carefully-worked-out combination of CARBORUNDUM Super Refractories to keep weight low and cut heat absorption of the lining to a minimum with greatest possible service life under working conditions:

A CARBOFRAX® silicon carbide hearth provides high thermal conductivity, abrasion-resistance, and load-carrying ability at the 2300°F. work chamber temperature.

CARBOFRAX piers have so much hot strength that they can be light and slender yet still furnish adequate support for the heavy furnace charges.

MULLFRAX® W electric furnace mullite skews are nonspalling and provide excellent load-carrying strength at high temperatures, with low heat conductivity.

ALFRAX® BI aluminum oxide brick are used for the sidewalls and roof. One of the most effective of all insulating materials for very high temperatures, these ALFRAX materials keep heat costs down; are light in weight, nonspalling and highly refractory.

This arrangement of CARBORUNDUM refractory materials gives the big furnace low heat storage and fast heating . . . is economical to operate and maintain. These Super Refractories can improve your furnaces in the same way. Why not check up on them now? Write Refractories Division, The Carborundum Company, Perth Amboy, N. J., Dept. B125.

CARBORUNDUM

Registered Trade Mark

Case History No. 31 CHAIN BOX

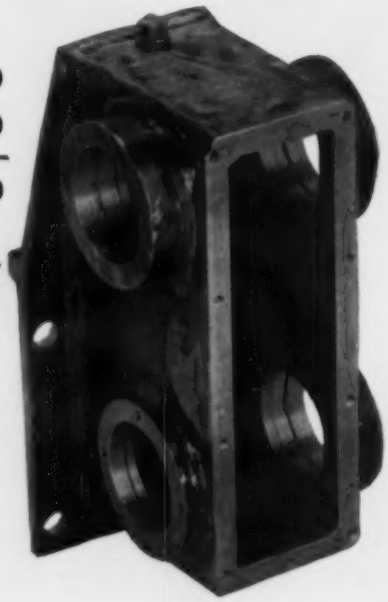


GRAY IRON CASTING

initial cost	$ 9.22
machining	$12.50
TOTAL COST	$21.72

WELDMENT

initial cost	$21.00
machining	$23.50
TOTAL COST	$44.50



GRAY IRON SAVES OVER 50%

The cost of this Chain Box was cut more than half by switching to one, uniform-strength Gray Iron casting. And there are no more welded seams of varying quality to worry about! An important fact, since this chain box is used on rugged road-building equipment. Pattern costs were quickly amortized.

It will pay *you* to look for new, cost-saving ways to use Gray Iron . . . and at the same time obtain the other unique advantages inherent in modern Gray Iron castings. Gray Iron is durable . . . rigid . . . absorbs vibration . . . is heat and corrosion resistant . . . has low notch sensitivity and a wide strength range. It is truly the proved metal that meets modern design needs better and more economically.

For specific technical and business information, write direct to Gray Iron Founders' Society, Inc., National City—East 6th Building, Cleveland 14, Ohio.

This symbol assures you the most for your casting dollar



Here's why it pays to call in one of the more than 500 leading foundries displaying the Society symbol:

- The most recent technical and business information is available to each member through the Society to help you design better products at lower cost.
- The use of sound cost accounting procedures is recommended and encouraged among Society member foundries, assuring full value for your casting dollar.
- Improved castings result from the advanced techniques and the high sense of responsibility of Society members.

MAKE IT BETTER WITH GRAY IRON

GRAY IRON FOUNDERS' SOCIETY

Registered Trade Mark

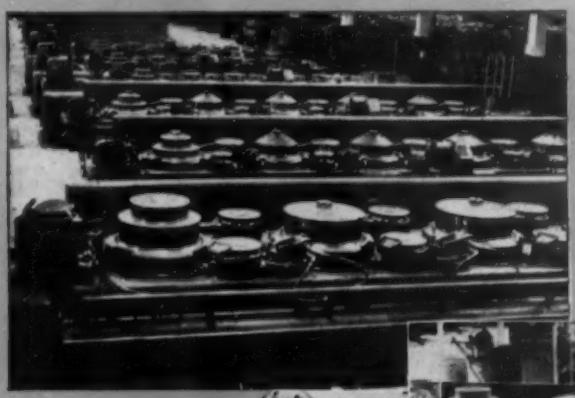


Wire

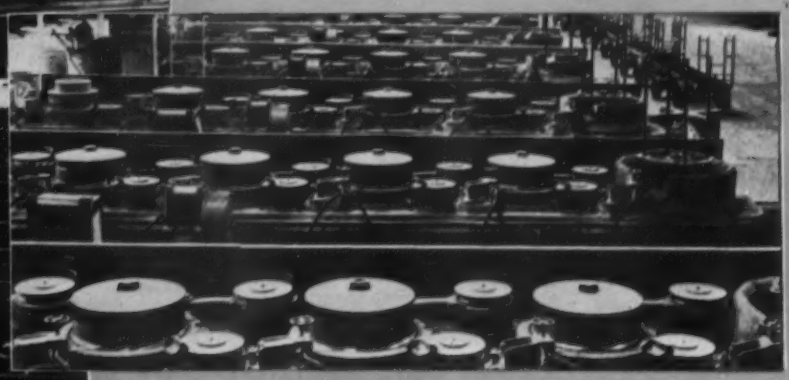
BY THE CARLOAD
OR THE TRAINLOAD

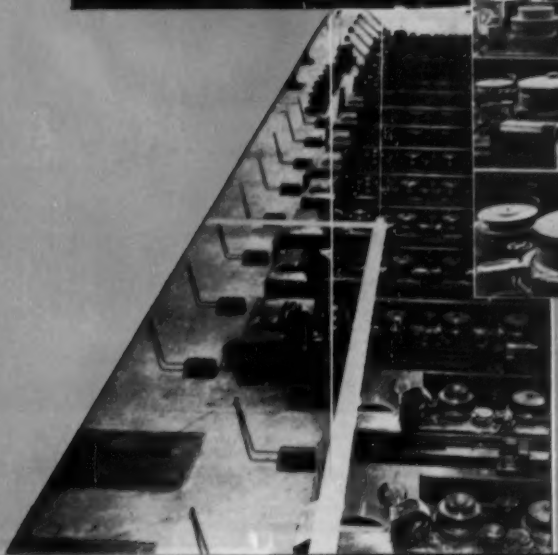
produced dependably at high rates by ... Vaughn®

MOTOBLOX®



Let your high-volume needs in wire be matched by Vaughn Motoblox' high productivity! These famous machines meet quotas with quality—in speed and dependability. A Vaughn engineer will be happy to give you the facts, at your convenience.



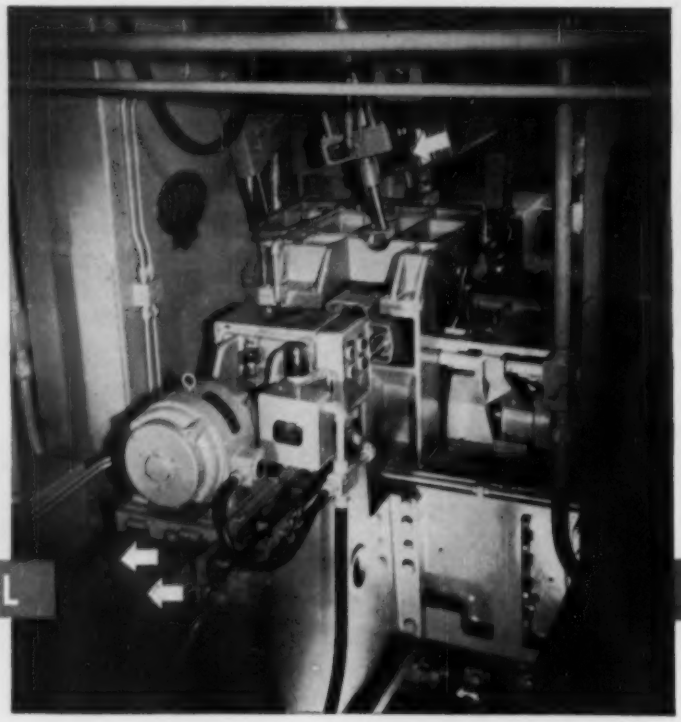


The VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U.S.A.

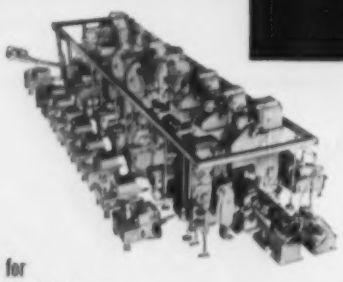
COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

50 Auto Blocks An Hour!

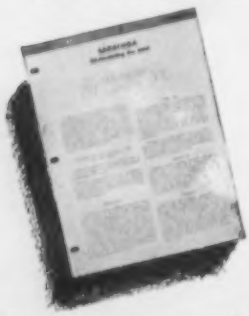
WITH THE HELP OF LUDLUM SARATOGA TOOL STEEL



Ludlum Saratoga was used for the steel ways (note arrows, above) of this giant unit, illustrated at left in a bird's-eye view reduced to miniature size.



Write for
BLUE SHEET ON SARATOGA



This concise four-page folder gives all needed handling and shop treatment details on Saratoga. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

Address Dept. A-72

98 SEPARATE OPERATIONS are carried on by this versatile machine which turns out 50 V8 auto engine blocks an hour. It consists of 18 machining units, each of which is fitted with hardened and ground steel ways of Ludlum Saratoga to guarantee accuracy in production.

MILLING, TREPANNING, DRILLING, counterboring, reaming, chamfering, automatic inspection of holes for depth and removal of chips are the operations performed by this amazing mechanism.

LUDLUM SARATOGA WAS USED BECAUSE its extreme hardness, high resistance to wear, and excellent machinability more than met the customer's high requirements for maintaining accuracy in this huge, multi-station machine.

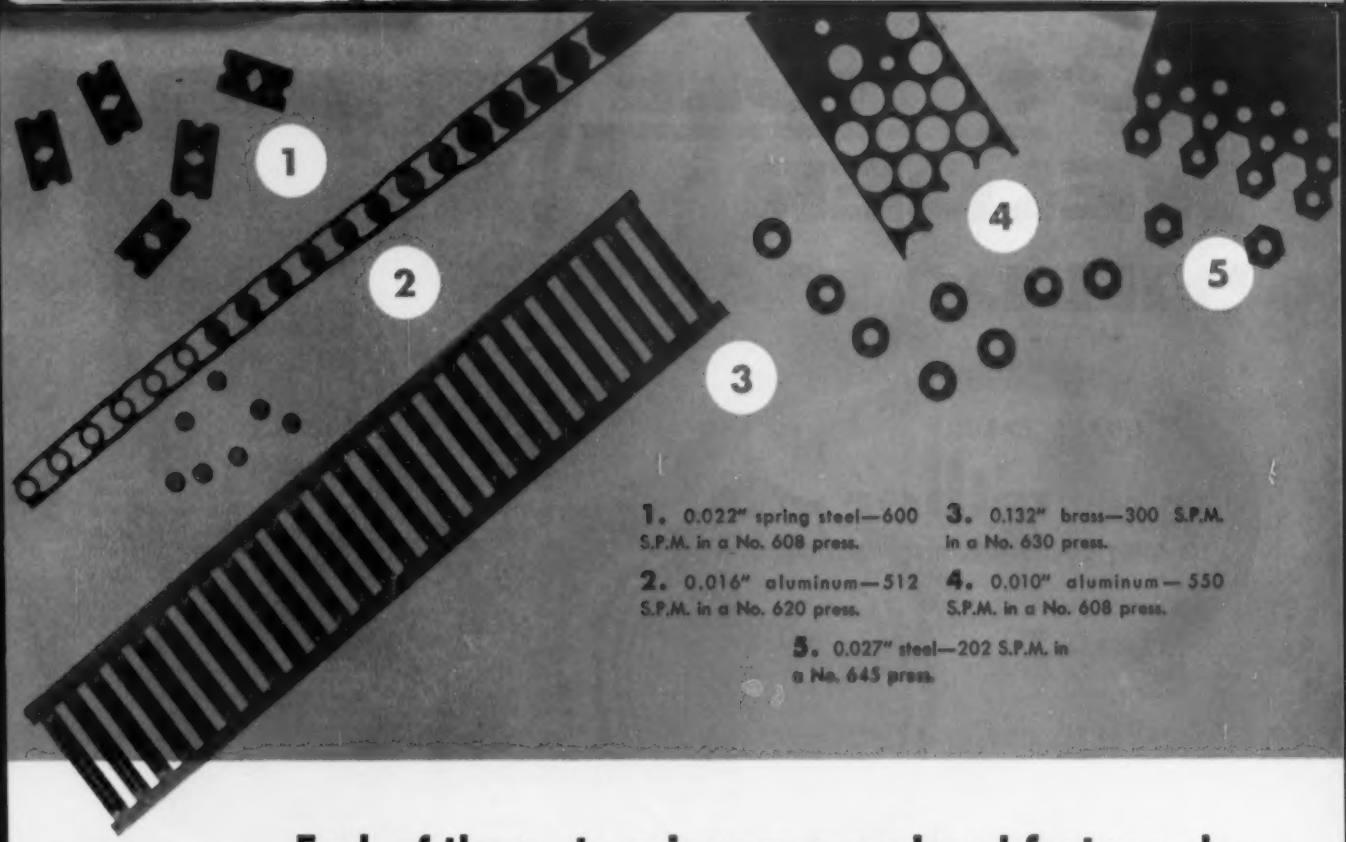
ALLEGHENY LUDLUM METALLURGICAL SERVICE can solve *your* tool or die steel problems. ● Call your local A-L representative or distributor today, or write *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

WAD 8188

AL® FINE TOOL STEELS SINCE 1854



1. 0.022" spring steel—600 S.P.M. in a No. 608 press.

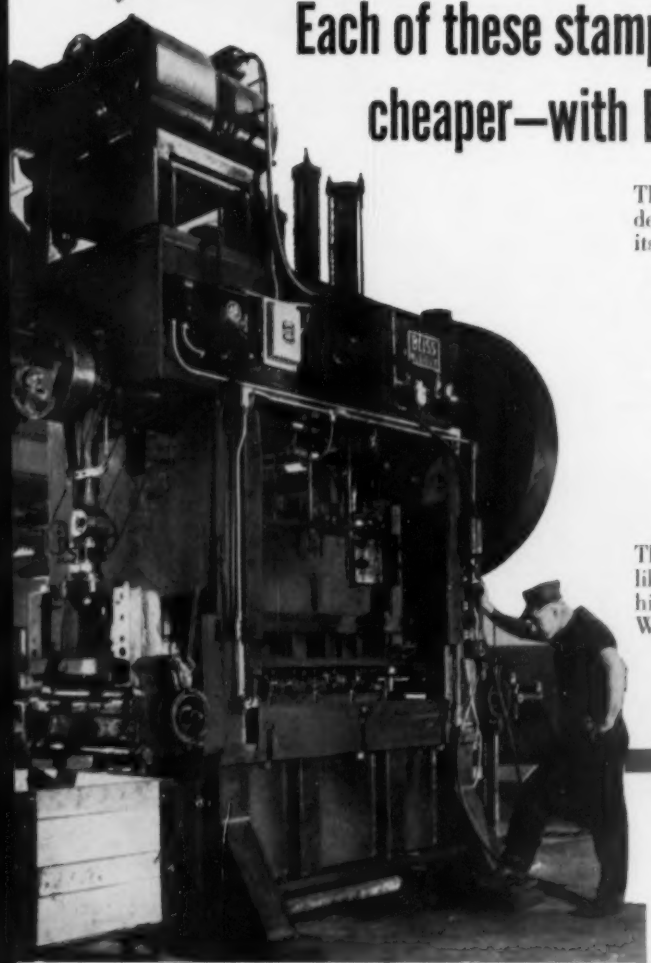
2. 0.016" aluminum—512 S.P.M. in a No. 620 press.

3. 0.132" brass—300 S.P.M. in a No. 630 press.

4. 0.010" aluminum—550 S.P.M. in a No. 608 press.

5. 0.027" steel—202 S.P.M. in a No. 645 press.

Each of these stampings was produced faster and cheaper—with BLISS High Production Presses



The Bliss 600 series of High Production Presses, especially designed and developed for high-speed stamping, has proved itself on America's faster production lines:

- At Lima Register—5 Bliss Automatic Presses replaced 65 hand-fed presses. Example of the unusual savings: floor register valve costs only 1/25th of a hand-fed stamping.
- At IBM—5 Bliss Automatic Presses are used for short run typewriter parts production—die changeover is so easy that production has been boosted "an estimated 25%".
- At Briggs & Stratton—350 magneto armature parts are turned out each minute—on one 620 Bliss High Production Press!

There's a Bliss bulletin which describes in detail examples like these—examples which may show how you can solve a high production problem of your own—with a Bliss press. Write for catalog 27-A today.

BLISS
SINCE 1857

is more than a name...it's a guarantee!

E. W. BLISS COMPANY, Canton, Ohio

PRESSES, ROLLING MILLS, SPECIAL MACHINERY

U. S. Plants in Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; San Jose, California; Pittsburgh and Midland, Pa.
Branch Offices in Burbank, Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Pittsburgh, Rochester, Salem, San Jose, Toledo, Washington, D. C.; and Toronto Canada. Other representatives throughout the world.
E. W. Bliss (England) Ltd., Derby E. W. Bliss Co. (Paris), France

NO SINGLE WELDER WILL DO IT ALL!



THERE'S EXACTLY
THE RIGHT **miller** WELDER
TO MEET EVERY WELDING REQUIREMENT

MILLER SR RECTIFIER TYPE DC ARC WELDERS

Available in 200, 300, 400 and 600 amperes, it is a superior direct current welder using Miller Unitran transformer control and selenium rectifiers for conversion from 3 phase AC line current. Miller SR Welders feature widest possible current range, extreme arc flexibility, maximum electrode deposition rate and highest electrical efficiency.



THE *New* MILLER SRH RECTIFIER TYPE DC ARC WELDER

A new concept in welder design for all DC metalic arc welding. Available in 200, 300 and 400 amperes. It is ruggedly constructed, compact, and is designed to lend itself to stacking for parallel operation or to conserve floor space. It has single range control and is weatherproof.



MILLER ARC-WELDERS FOR TUNGSTEN ARC WELDING PROCESS

These Miller Welders feature the patented Miller UNITRAN control circuit which combines the transformer with its own integral flux diverter. This, in conjunction with adequate open circuit voltage, high frequency, balancing resistor and optional controls insures superior uniformity and flexibility throughout the entire welding range. Available in nine models.



THE *New* MILLER MULTI ARC COMBINATION AC-DC WELDER

Available in 14 models, this new Miller Welder provides both AC and DC welding power for applications where both are required. It operates from a single phase power line and is available with high frequency and controls designed especially for inert gas arc and spot welding.



MILLER 100 SERIES HEAVY DUTY INDUSTRIAL TYPE AC WELDERS

Designed for heavy production welding and automatic welding applications. Available in eight models. The 100 Series Welders permit faster welding—as much as 35% faster. Movable coil design and 80 volts O.C.V. produces uniform and better welding characteristics throughout the entire range of the welder.

Write today for complete information on these Miller Welders.

ARC · SPOT miller GENERATORS WELDERS

miller

ELECTRIC MANUFACTURING CO., INC.
P.O. Box 798 Appleton, Wisconsin

"... if it's MILLER you know it's the finest..."



Dragonfly
ANAX JUNIUS

Lightweight

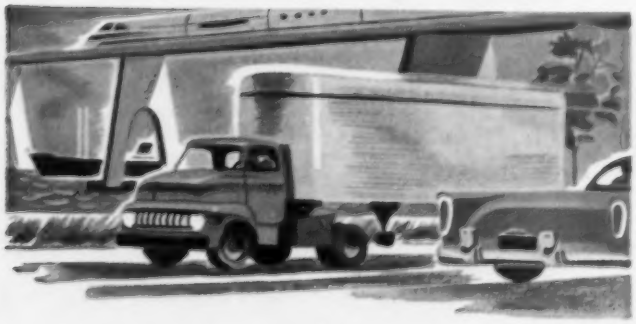
In the world of insects, the Dragonfly (also known as the "devil's darning needle") ranks high for lightweight insofar as size is concerned. It is one of the most active members of the insect kingdom.

This creature can remain almost constantly in the air, flashing forward and backward. It can remain poised in a fixed position and then dart faster than the eye can follow—only to reappear in almost the same spot.

In the world of materials, aluminum is one of the lightest of metals. Aluminum weighs one-quarter to one-third as much as other commercial metals. With proper design, aluminum can cumulate direct weight savings and multiply them many times—as much as ten times in the structure of aircraft. Compared on an equal weight basis with traditional metals, aluminum can give several times the number of parts per pound.

Because rotating and reciprocating parts made of aluminum are light in weight, their inertia forces are low; braking and accelerating forces also are less than with heavier materials.

Aluminium Limited Sales, Inc. is distributor in the United States for aluminum from Canada. Why not investigate making your products of aluminum?



Lightweight

In the construction of Automobiles, Trucks and Trailers, Ships, Trains, Drums and Barrels, aluminum is put to more new uses than any other metal. Lightweight aluminum means extra payloads and more economical operation.

Aluminum *from* Canada

Aluminium Limited Sales, INC.
630 FIFTH AVENUE · NEW YORK 20, N. Y.

CLEVELAND · CHICAGO · DETROIT · LOS ANGELES · BUENOS AIRES · SÃO PAULO

TRAMRAIL TRANSFER CRANES
SPEED BODY WORK



TRUCK and trailer bodies are big, heavy and awkward to handle. It takes considerable time to move them from one point to another by ordinary means. With an overhead Cleveland Tramrail transfer crane system, however, the work is made simple, easy and fast.

C & C Trailer & Body Co., Oakland, California, erected a plant consisting of two prefabricated Soule Steel buildings assembled together, side by side. A 3-ton, 3-runway transfer crane was installed in each. Two cross-over spurs were provided, permitting a load being transferred from one crane to the other. Bodies, or other loads, can therefore be picked up at any point in the entire plant and delivered directly to any other point.

The smooth rolling cranes are always ready to provide handling service any place in the plant. They eliminate a great deal of unnecessary motion. Handling time is reduced and production speeded, resulting in lower costs.



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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

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THE CLEVELAND CRANE & ENGINEERING CO.
4808 EAST 290th STREET, WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



Brainard
SHARONSTEEL
STEEL DIVISION
SHARON STEEL CORPORATION

FREE BRAINARD STRAPPING SERVICE BULLETIN tells you why it pays to do business with Brainard. Mail coupon today or call your near-by Brainard strapping expert for an on-the-job demonstration.

Brainard Steel Division
of the Sharon Steel Corporation
Dept. I-12, Griswold Street, Warren, Ohio

☐ Please send me your free Strapping Service bulletin.

☐ I would like to have a Brainard representative call.

Name_____

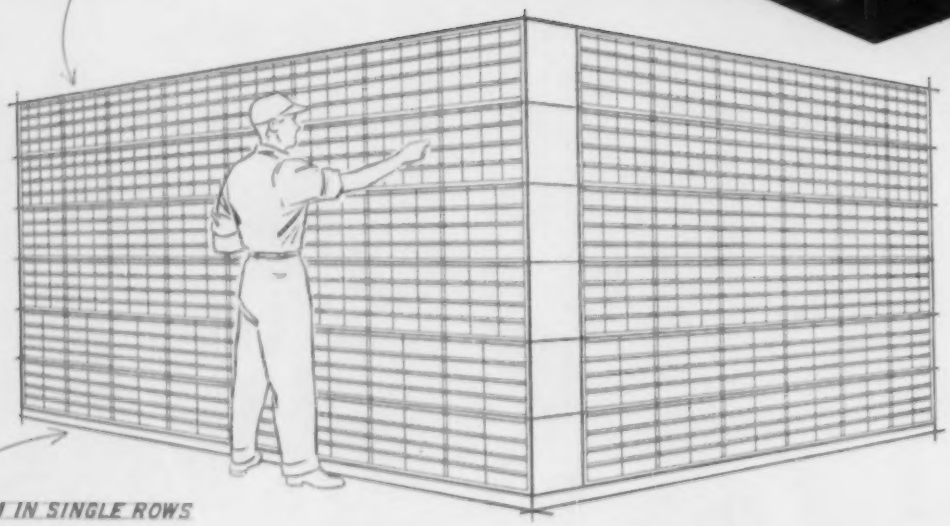
Company_____

City_____ State_____

HOW TO USE HALLOWELL STORAGE WALLS TO MAKE CONVENIENT STORAGE SPACE



USE THEM TO SET UP A TOOL CRIB, PARTS ROOM OR GAGE ROOM — ANYWHERE IN YOUR PLANT



USE THEM IN SINGLE ROWS OR BACK TO BACK

USE THEM AS ACCESSORIES TO CABINET AND WORK BENCHES OR OTHER WORK SURFACES





Prime Cold Rolled Steel · All Welded and Finished with Baked-on Enamel · Interchangeable Drawers · 3 Different Size Drawers Can Be Intermingled in the Same Case · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2093 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 17, Pa.

HALLOWELL SHOP EQUIPMENT DIVISION
STANDARD PRESSED STEEL CO.
SPS
JENKINTOWN PENNSYLVANIA

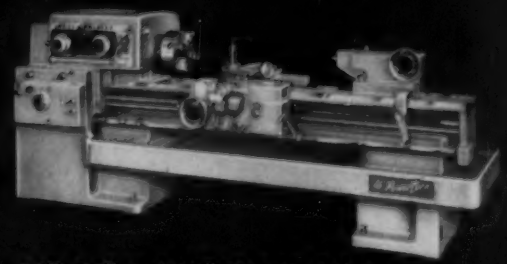
BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING



LODGE & SHIPLEY

Powerturn

the "stand-out" lathe



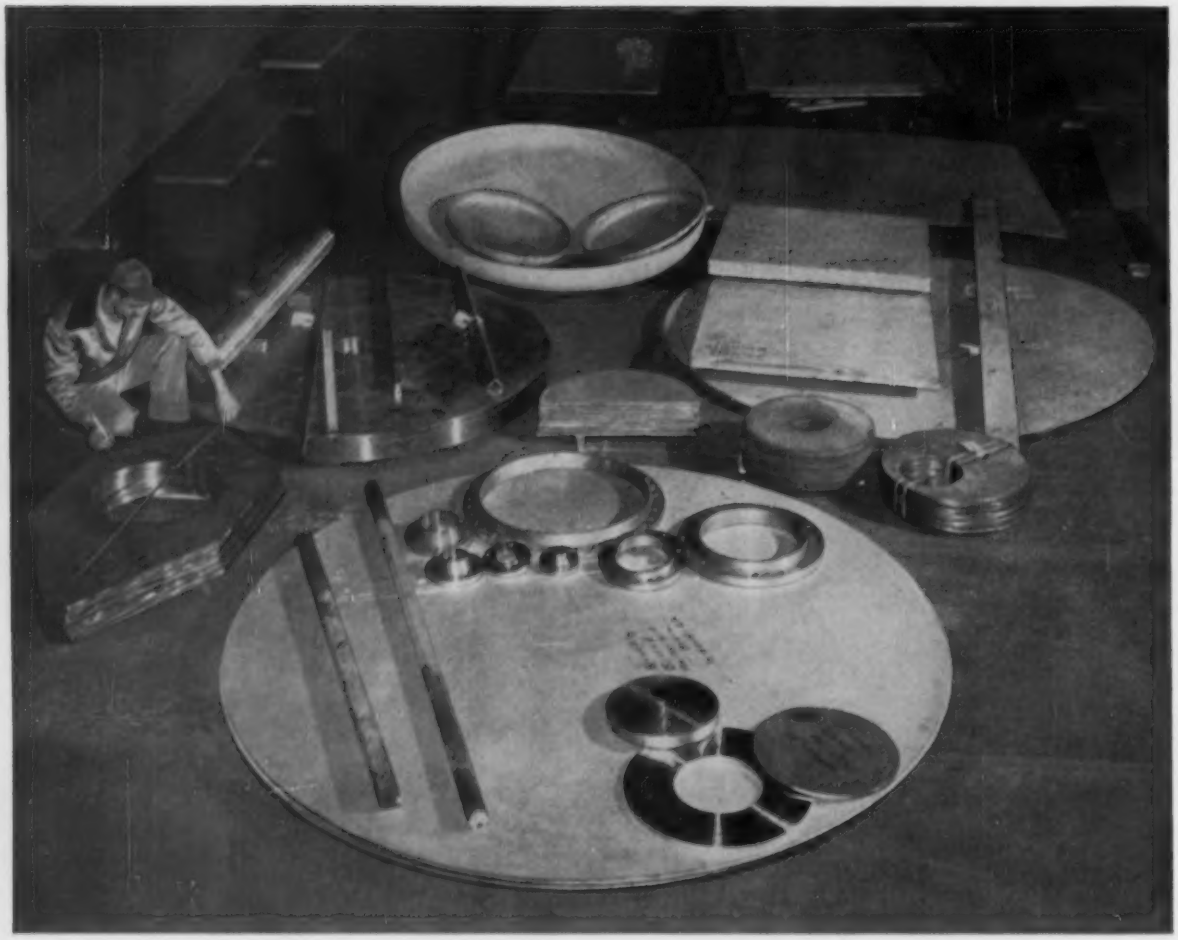
. . 13", 16" and 20" Standard sizes
. . Engine, Toolmaker, Gap, Manufacturing types
. . 45° and 90° COPYMATICS
. . NEW LITERATURE ON REQUEST

Modern design, rugged strength and high quality stand out in every detail of new Lodge & Shipley POWERTURN Lathes. More important, we can offer you positive assurance of increased productive ability.

Acclaimed at the Machine Tool Show, these new lathes combine traditional Lodge & Shipley accuracy and strength with new features. These features give still greater precision and operating convenience whether for production or general purpose turning.

We'll help you determine the part POWERTURN can play in your lathe operations. Address: The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

More than ever before, your LODGE-ical choice is... **Lodge & Shipley**



Delivery when promised . . . dependability in every piece . . . and economically produced in stainless steel

on Carlson Order No. 17656

Not every shipment is as diversified as GOC 17656 but it illustrates the typical all-around service in stainless steel available from G. O. Carlson, Inc.

There are plates, heads, rings, circles, flanges, bars and rounds—all stainless steel to chemical industry standards—all made to match the specifications on the customer's blueprint. It took special equipment to make up this order—equipment designed and built by Carlson engineers who work *exclusively* in stainless.

This equipment in the hands of Carlson specialists *lowers* costs. You pay no freight on material you can't use and you save man-hours in easier fit-up, because the material is ready for fabrication when you get it.

When you order your stainless steel from G. O. Carlson, Inc. you can be sure of three things: (1) it is economically produced from the highest quality material; (2) it is cut to your specifications; (3) it is shipped on time. Write *right now* for complete information.

Stainless Steels Exclusively

G. O. CARLSON, INC.

THORNDALE, PENNSYLVANIA

Plates • Plate Products • Forgings • Bars • Sheets (No. 1 Finish)

District Sales Offices in Principal Cities

Absolutely Vital

TO BETTER DEEP DRAWING



If deep drawing is one of the operations in your plant, you should know about the McKay Flex-Roll Processor, a rugged, efficient machine that quickly works steel to a degree that it can be deep drawn without tearing or showing draw strain.

Hundreds of manufacturers, including every major auto producer, have found the Flex-Roll pays for itself in a few months by substantially reducing scrap and metal finishing after the draw.

Let us put you in contact with a Flex-Roll user — he'll quickly convince you that it's absolutely vital to modern day deep drawing.

The McKAY MACHINE Company
YOUNGSTOWN, OHIO

McK

McKAY

Flex-Roll

PROCESSOR



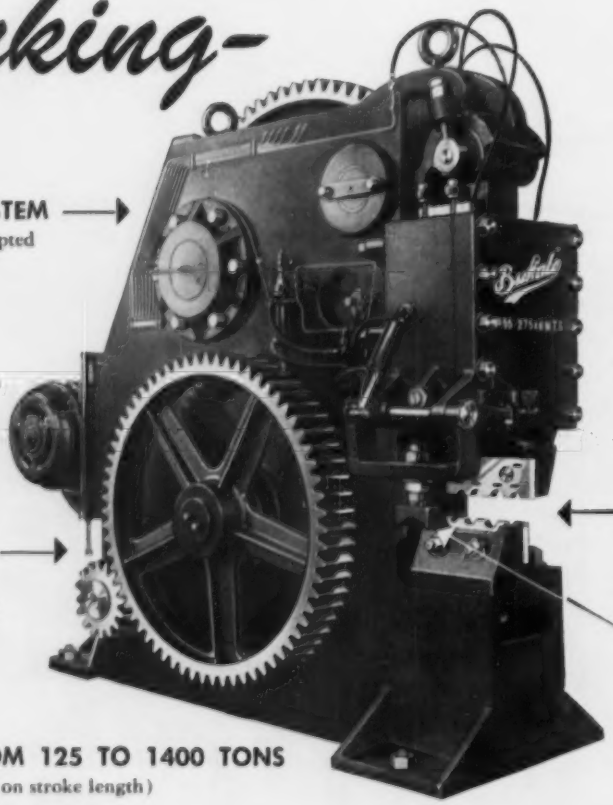
RIGHT FOR YOUR HEAVY-DUTY *Punching- Shearing- Blanking-*

"Buffalo"

MILL TYPE SHEAR

CENTRALIZED LUBRICATION SYSTEM provides long, uninterrupted service life.

HIGH TENSILE ELECTRICALLY WELDED STEEL PLATE FRAME MEANS GREATER STRENGTH WITH LESS MASS. Gears, bearings, plunger and all parts are of corresponding strength.



AMPLE TOOLING SPACE open on three sides, has adequate horizontal and vertical space to permit relatively heavy top and bottom bolsters.

AUTOMATIC AIR OPERATED TILTING STRIPPER

Shown is the "Buffalo" No. 55 Mill Type Shear with 6" stroke

IN CAPACITIES FROM 125 TO 1400 TONS
(depending on stroke length)

Shear No.	*Tons*	*Stroke*	*Tons*	*Stroke*
51	250	@ 2¼"	125	@ 4½"
52	300	@ 2½"	165	@ 4½"
53	370	@ 2¾"	200	@ 5"
54	420	@ 3"	210	@ 6"
55	500	@ 3¼"	200	@ 8"
56	550	@ 3½"	240	@ 8"
57	570	@ 4"	285	@ 8"
58	650	@ 4"	325	@ 8"
59	725	@ 4½"	400	@ 8"
60	875	@ 4½"	500	@ 8"
61	1050	@ 4½"	600	@ 8"
62	1400	@ 5"	875	@ 8"

Another illustration of the "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life—in "Buffalo" Machine Tools.

WRITE FOR BULLETIN 3650 and our recommendations on your particular operation.



BUFFALO FORGE COMPANY
492 BROADWAY BUFFALO, N.Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

Takes the shock around the clock with TIMKEN® bearings on the axles

WHEN tons of steel pour into the molds on these ingot cars, terrific shock loads hit the bearings. Bouncing over rough track also puts shock loads on the bearings. That's why the axles of all the ingot cars in this large Eastern steel mill roll on Timken® tapered roller bearings.

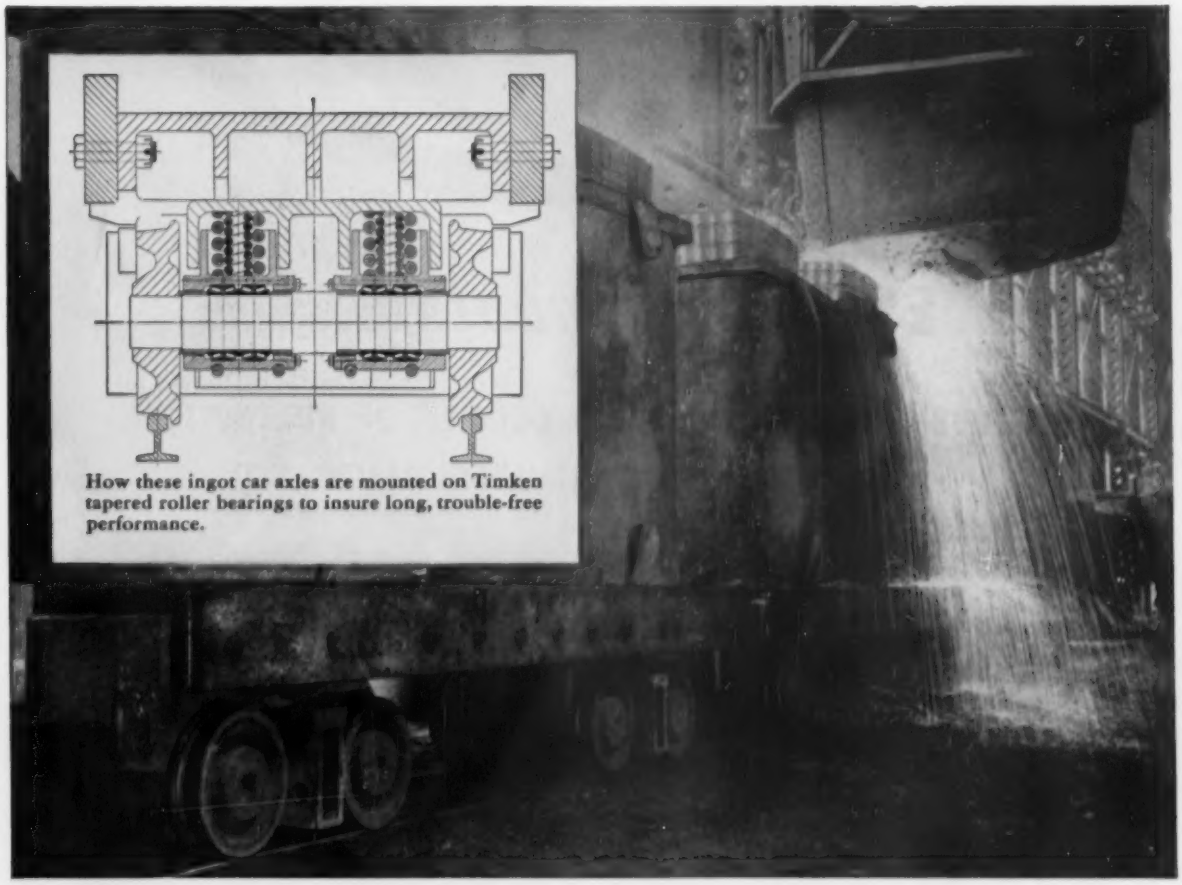
Because case-hardened Timken bearings have tough, shock-resistant cores, they take the shock loads easily, keep the cars ready to roll at any time.

Less hauling power is needed to start the cars, too. Timken bearings' true rolling motion and extremely smooth surface finish practically eliminate friction, cutting starting resistance 88%.

With Timken bearings on the job, the problem of worn-out thrust washers no longer worries mill operators. The tapered construction of Timken bearings takes both radial and thrust loads in *any* combination. No auxiliary thrust devices are needed.

If you build or buy mill equipment, why not get all these advantages? Make sure the trade-mark "Timken" is stamped on every bearing used. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



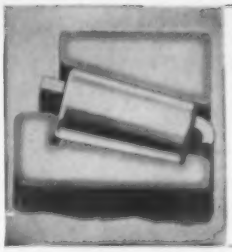
How these ingot car axles are mounted on Timken tapered roller bearings to insure long, trouble-free performance.



TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

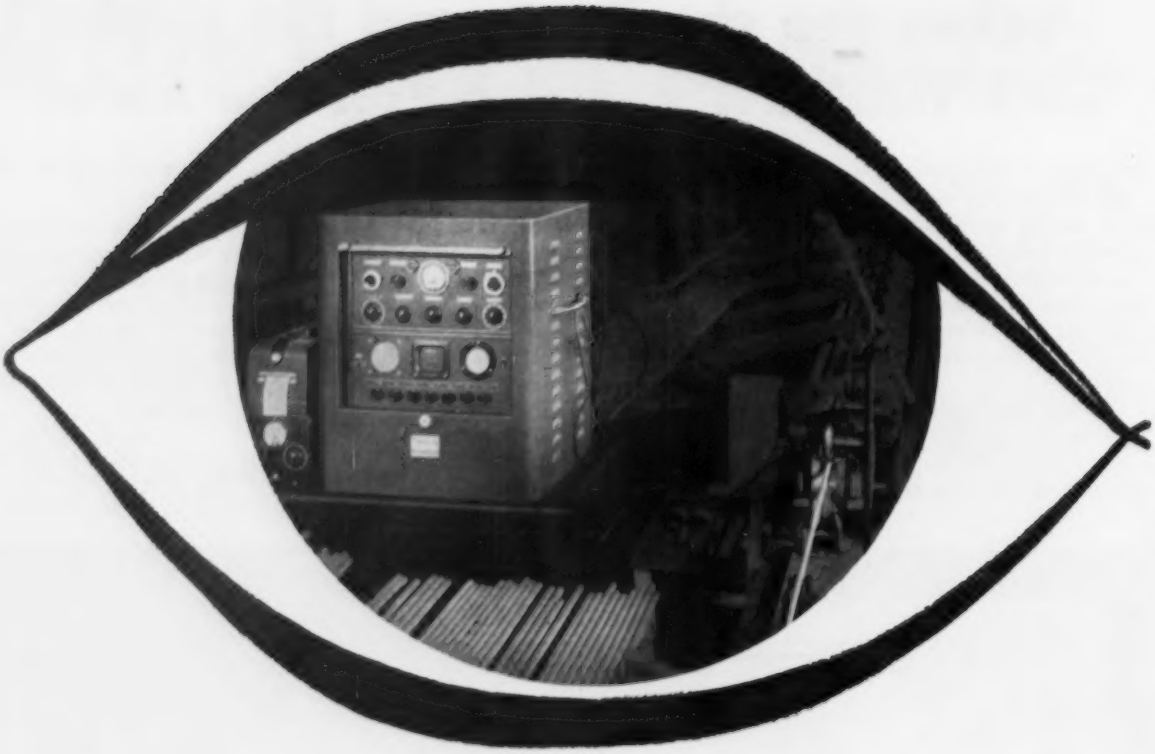
TAPERED ROLLER BEARINGS



GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.



a new "EYE" at *Carpenter*...

GIVES YOU THE HIGHEST DEGREE OF PERFECTION POSSIBLE IN STAINLESS TUBING!

Now, minute tubing defects invisible to the human eye . . . even those not detectable by any other production non-destructive testing method, will not escape the penetrating eye of a new non-destructive test in the Carpenter mill.

It's the most exacting and thorough quality control device ever developed for testing austenitic stainless tubing during production. Flaws that don't show up in hydrostatic tests are brought to light by this new testing device as it critically scans the entire I.D. and O.D. periphery of the tubing. It also detects variations in composition, gauge, sub-surface and surface conditions at production speeds.

What does this newest Carpenter advance mean to you? It means that Carpenter now assures you of better-than-ever quality . . . the highest degree of perfection possible in stainless tubing. It means added assurance for you that Carpenter Stainless Tubing, more than ever, is your best buy for life-long trouble-free service.

Ask your Carpenter Representative or local Carpenter Distributor for more details about this new quality control measure. Specify Non-Destructive Test on your inquiries and orders.

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Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

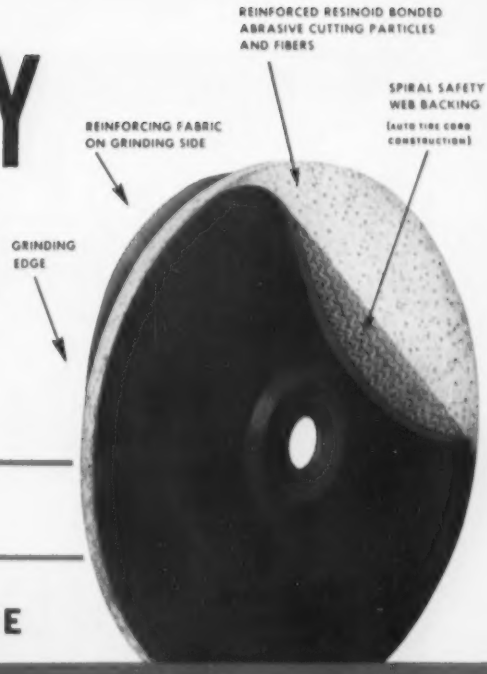
Carpenter

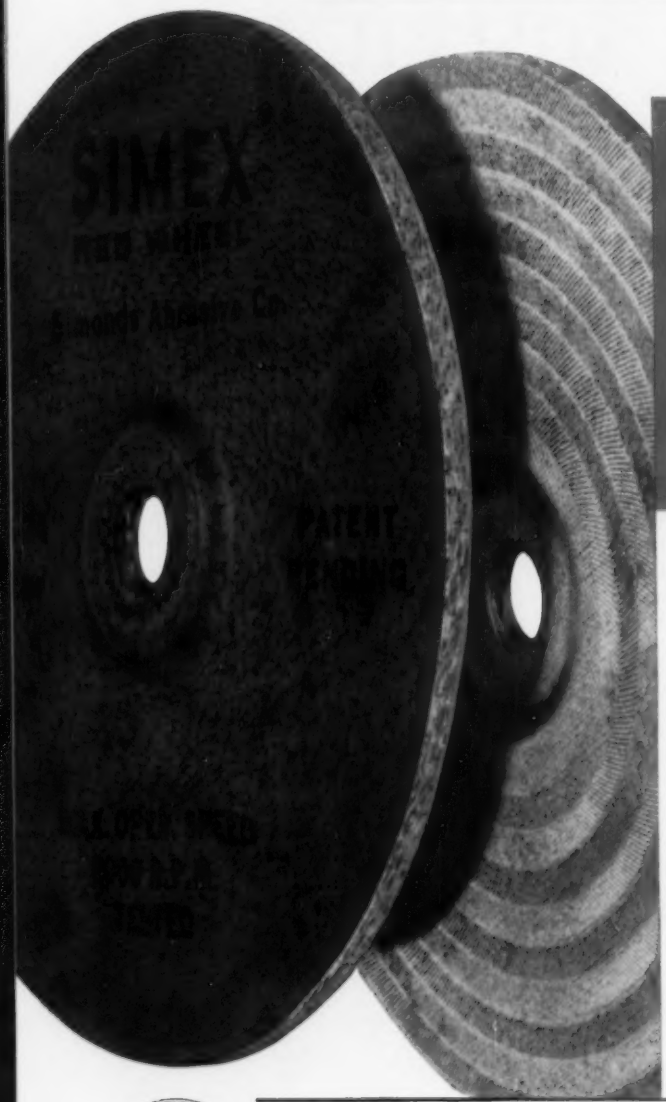
Stainless Tubing & Pipe

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FOR EXTRA STRENGTH

EXTRA SAFETY





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New

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RED WHEEL

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Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Heller Tool Company, Newcomerstown, Ohio, Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and Simonds Canada Abrasive Co., Ltd., Arvida, Quebec

To help you find that just-right plant site...

Every day we chart the business activity of 2319 communities

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THE RESULT . . . a perpetual inventory of plant-site information about a 45,000-square-mile territory abounding in low-cost fuel and power for all types of metal-working industries. This data is unequalled in up-to-the-minute accuracy and completeness.

For nearly fifty years, the American Gas and Electric System has served practically every home and business in this growing seven-great-state area that now includes 2319 towns.

Our men are in these communities every day, every week of the year—a network of on-the-job personnel carefully reporting changes of economic and social import.

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Use WELDED STEEL for Greater Strength with Less Weight!



If you use weldments, or are contemplating their use, you are a potential customer of The R. C. Mahon Company. If you require parts or assemblies, including large, heavy pieces, where time and pattern cost are a consideration, you can turn to Mahon with complete confidence. Mahon's service to users of welded structural or heavy plate fabrications is complete from design or redesign to finished machining and assembling. Illustrations on this page are typical of thousands of parts and assemblies produced by Mahon for manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. If you need weldments, or welded steel in any form, you, like hundreds of others, will find in the Mahon organization a unique source . . . a source where design skill and advanced fabricating techniques are supplemented by craftmanship which assures you a smoother, finer appearing product embodying every advantage of Steel-Weld Fabrication. See Sweet's Product Design File for information, or write for Booklet showing Mahon's facilities to serve you.

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SALES ENGINEERING OFFICES in NEW YORK and CHICAGO

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

Wagner®
ELECTRIC MOTORS
...the choice of leaders in industry

New NEMA Frames
Standard and Explosion-proof



Type EP
215 Frame

Wagner Totally-Enclosed Fan-Cooled Motors

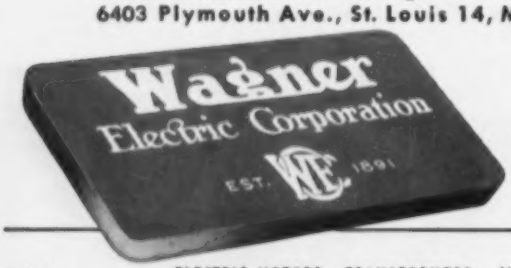
cut maintenance time and costs

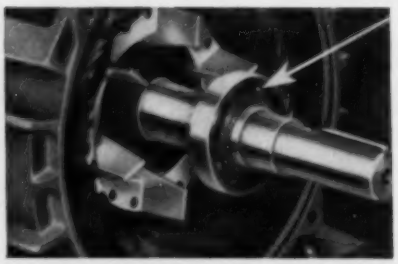
Check the features of the new *Wagner Type EP Totally Enclosed Motor*. They spell the difference between needless expenditures in maintenance time and costs . . . and a definite savings in motor upkeep and repairs. You'll find that for general industrial use where dust, dirt, filings, abrasives, steel chips or moisture are present, the Wagner Type EP Motor gives steady, troublefree performance and longer service life.

Wagner Type JP Explosion-Proof Motor . . . has the same quality construction as the Type EP — plus added features which make it completely safe to operate where explosive dust, gases or vapors are present.

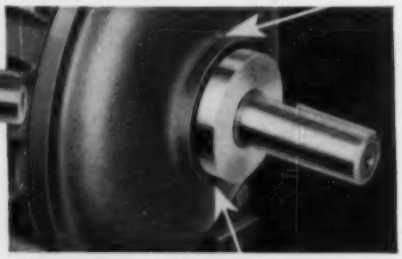
Both Type EP and JP Wagner motors are available in ratings up to 250 horsepower. For complete information, just call the nearest of our 32 branch offices, or write for Bulletin MU-203.

Wagner Electric Corporation
6403 Plymouth Ave., St. Louis 14, Mo.





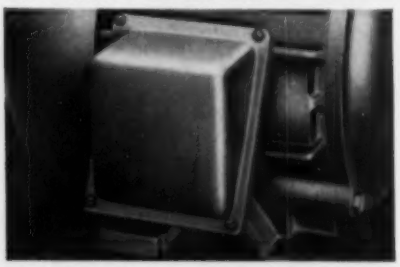
1 HEAVY-DUTY BALL BEARINGS—Highest quality bearings of more than ample capacity provide long, troublefree service.



2 BEARINGS CAN BE RE-LUBRICATED—Wagner motors can be re-lubricated when necessary to prolong bearing life.



3 BEARINGS STAY CLEAN—Both ends of these motors are equipped with running shaft seals, a machined collar mounted on the motor shaft.



4 EASY TO CONNECT—Large diagonally-split conduit box provides ample room for making connections. Leads are permanently identified.

5 NO GREASE LOSS—Bearing housings have effective seals to prevent escape of grease.

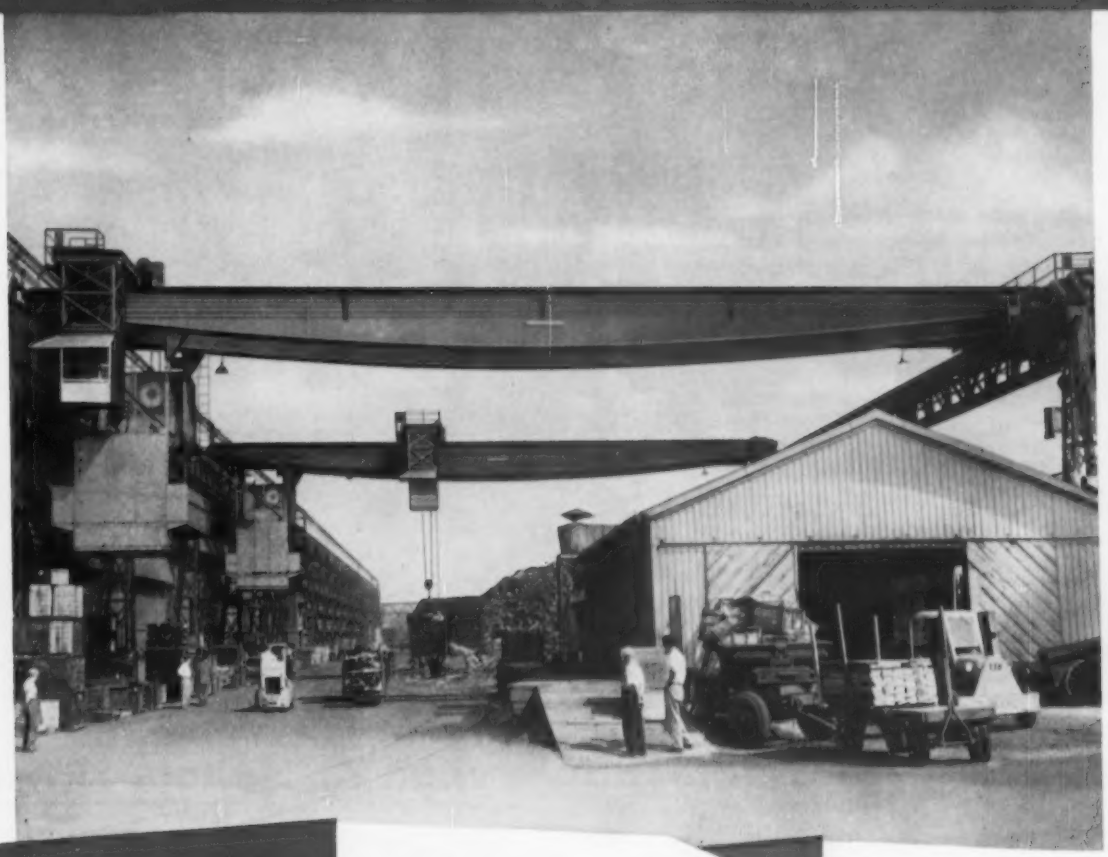
6 RIBBED FRAME—Ribs on the corrosion-resistant cast iron frames add mechanical strength and increase the surface area for more efficient cooling.

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NORTHERN CRANES ★ HOISTS ★ MATERIAL HANDLING EQUIPMENT

for faster, automatic handling of foundry yard materials

These 100-foot span NORTHERN CRANES are especially designed and equipped to serve the production foundry yard in an automobile manufacturing plant.

For best visibility and control of all crane operations, operators' cabs are attached to and travel with the crane trolleys.

Loading and weighing hoppers are arranged for convenient transfer loading to other handling equipment.

This is one of the many installations of NORTHERN CRANES which mechanize handling operations and substantially reduce handling costs.

Let us send you Bulletins G-700 and SE-108.

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BUT at Lamson & Sessions these things are more than a cause for pride . . . *they are a way of doing business.* From the apprentice machinist to the top echelons, you will find the same spirit of pleasant cooperation.



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CYLINDRICAL SANDWICH OF STEEL...



A MULTI-LAYER PRESSURE VESSEL is built up from concentric layers of relatively thin steel plate progressively wrapped, tightened and welded together around an inner, pressure-tight cylinder. Inner layer is made like any solid wall vessel. This highly efficient, patented construction makes possible economies—*with safety and flexibility of design*—in heavy-wall vessels intended for use at extremely high pressures. United States Steel helped the manufacturer develop a special steel for these Multi-layer vessels.

saves money on heavy-wall, high-pressure vessels

With its ingenious Multi-layer pressure vessels, A. O. Smith Corporation opens up almost unlimited possibilities to the design engineer for commercial-size vessels for unusually high pressures—from 7500 to 30,000 psi. Instead of using hard-to-fabricate, heavy-gauge plates, A. O. Smith builds up the thick walls of these vessels with multiple layers of thin steel. As a result, welding conditions are improved and stress relief is not needed. Consequently, Multi-layer fabrication of heavy wall cylinders is more economical.

USS METALLURGICAL SERVICE HELPED SOLVE THE PROBLEM

When A. O. Smith engineers first conceived Multi-layer construction, process pressures were within limitations of standard A.S.T.M. steel strengths. However, as pressure demands increased, A. O. Smith needed a new and very special steel. And that is where United States Steel came to their aid. We helped them develop a high-tensile, high-yield strength, low-alloy plate steel with a minimum ultimate strength of 105,000 psi., a minimum yield strength of 70,000 psi., and good weldability.

HELP FOR YOU

When you have any sort of steel problem, let USS metallurgists help you with it—whether you need a special steel or just want to be sure you have the *very best* of the standard AISI analyses for your job. Phone our nearest district sales office. Or write United States Steel, Room 5060, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

See The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

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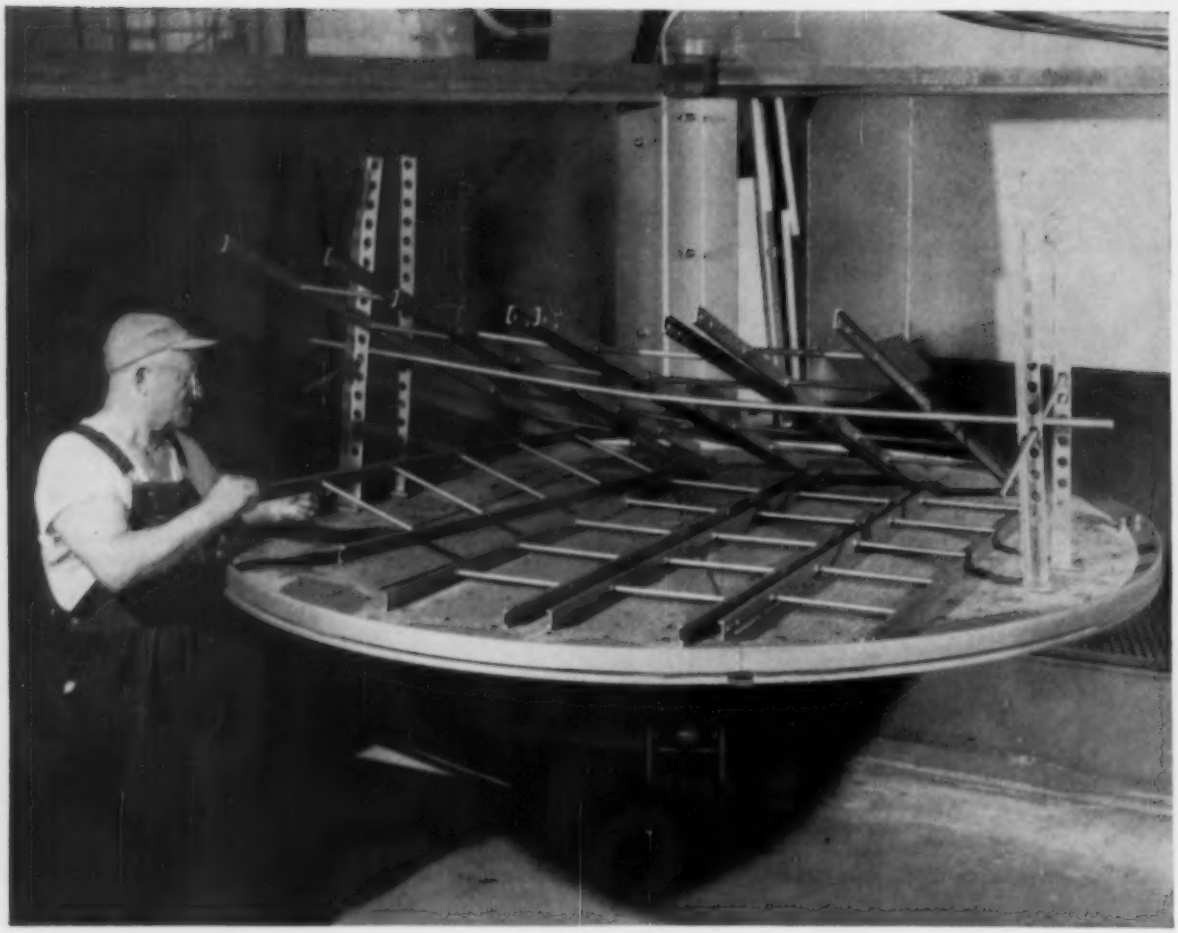
Carilloy USS Steels

5-2213

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

UNITED STATES STEEL



WHEELABRATING REPLACES PICKLING

in cleaning structurals prior to galvanizing

Large, relatively flat pieces, such as ladders and angle-iron frames, are mechanically cleaned by airless Wheelabrator blast cleaning after welding and before galvanizing at the South Milwaukee plant of Line Material Company.

Mechanical cleaning shows up welding defects that pickling failed to reveal. Rejects of galvanized parts have been substantially reduced and the matte finish imparted gives a better bond for galvanizing.

In addition, coated flux rods that give better welds and are easier to use can be employed now. With pickling, bare rods had to be used because no pickling solution could be found to clean welds made with coated rods.

To prepare surfaces for any type of finishing, use Wheelabrating.

For information on principles and application of mechanical cleaning, send for Bulletin 74-C.



WHEELABRATOR
CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)

510 S. Byrkit Street, Mishawaka, Indiana

World's Largest Builders of Airless Blast Equipment and Steel Abrasives



California giant Sequoias—
largest of all trees.

Unsurpassed-anywhere!

IT ALL COMES DOWN to one fact... that you can always count on Roebling high carbon flat spring steel to reduce preparation time, machine stoppages and rejects to a minimum. What's more, it's made as you want it... annealed, hard rolled untempered; scaleless tempered; tempered and polished, blued or strawed.

You *pay* for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

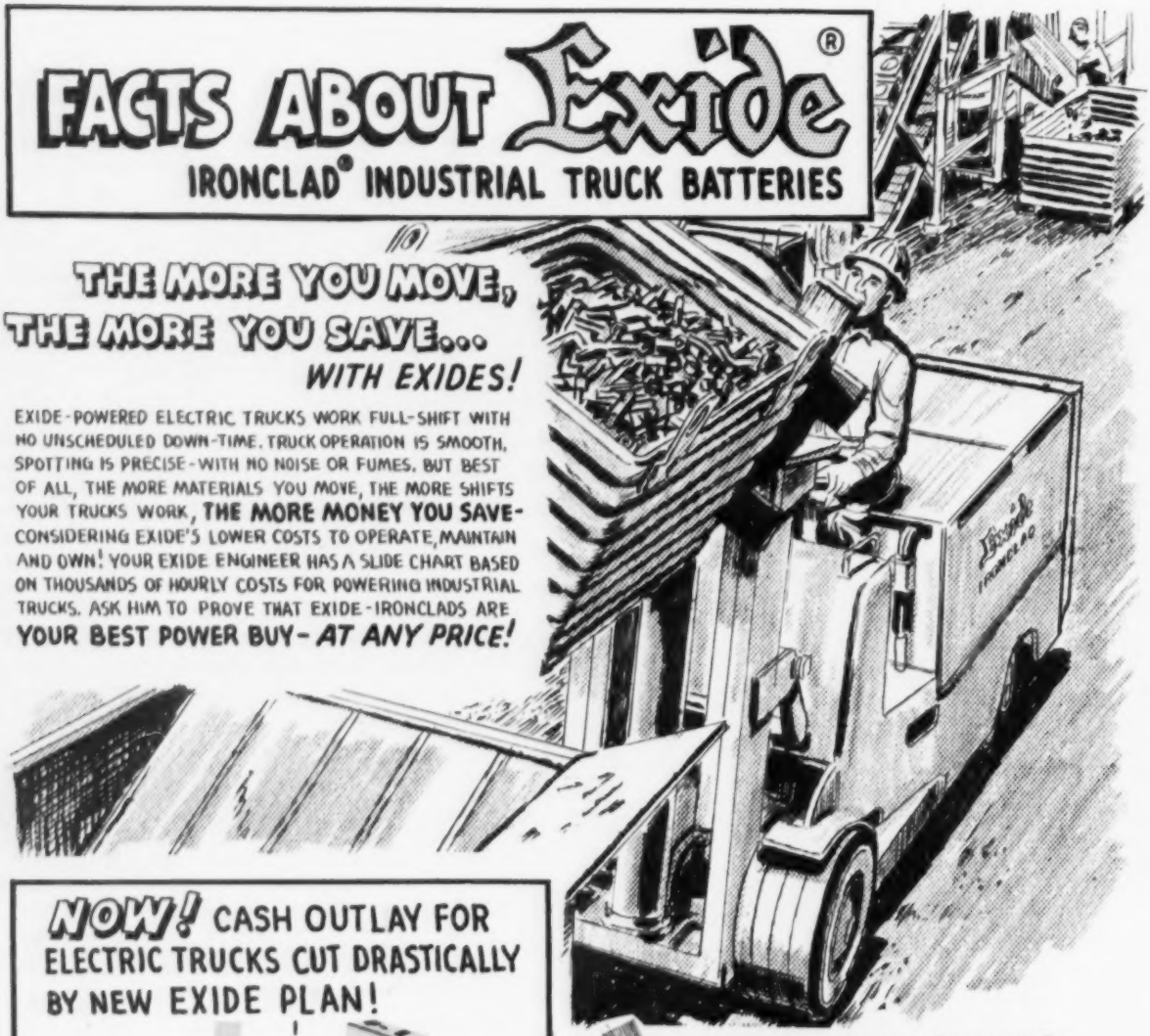
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EXIDE-POWERED ELECTRIC TRUCKS WORK FULL-SHIFT WITH NO UNSCHEDULED DOWN-TIME. TRUCK OPERATION IS SMOOTH, SPOTTING IS PRECISE - WITH NO NOISE OR FUMES. BUT BEST OF ALL, THE MORE MATERIALS YOU MOVE, THE MORE SHIFTS YOUR TRUCKS WORK, **THE MORE MONEY YOU SAVE** - CONSIDERING EXIDE'S LOWER COSTS TO OPERATE, MAINTAIN AND OWN! YOUR EXIDE ENGINEER HAS A SLIDE CHART BASED ON THOUSANDS OF HOURLY COSTS FOR POWERING INDUSTRIAL TRUCKS. ASK HIM TO PROVE THAT EXIDE-IRONCLADS ARE **YOUR BEST POWER BUY - *AT ANY PRICE!***

NOW! CASH OUTLAY FOR ELECTRIC TRUCKS CUT DRASTICALLY BY NEW EXIDE PLAN!



BUY ONLY THE TRUCK CHASSIS! CUT INITIAL CAPITAL OUTLAY AS MUCH AS 33⅓%!

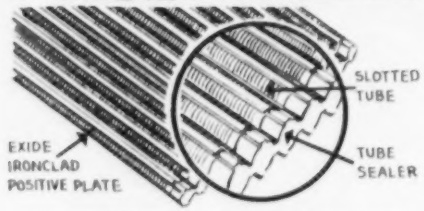
LEASE EXIDE-IRONCLAD BATTERIES AND CHARGER!

IN ADDITION TO THE SUPERIOR OPERATION OF ELECTRIC TRUCKS YOU GET BIG ANNUAL SAVINGS. A TYPICAL EXAMPLE OF HOW MUCH YOU SAVE EACH YEAR WITH ELECTRIC TRUCKS AND THE EXIDE PLAN:

1 TRUCK ON 3-SHIFT OPERATION SAVES $1425.76!

MAKE US PROVE THESE SAVINGS! CALL YOUR EXIDE SALES ENGINEER. ASK YOUR ELECTRIC TRUCK SALESMAN. WRITE FOR COMPLETE DETAILS ON THE EXIDE LEASING PLAN!

MAGIC POWER TUBES OF POLYETHYLENE!



NOW, ACID-PROOF, NON-CORRODING POLYETHYLENE PLASTIC TUBES AND SEALERS ARE INSIDE ALL EXIDE-IRONCLADS! DEVELOPED IN THE LABORATORY, TESTED IN THE FIELD, AND ALREADY PROVED IN CUSTOMER USE - THIS MIRACLE BATTERY MATERIAL IS THE LATEST IMPROVEMENT IN EXIDE-IRONCLADS. ITS USE GIVES YOU MORE POWER IN THE SAME SPACE! LONGER BATTERY LIFE! BETTER PERFORMANCE! LESS MAINTENANCE!

FOR THE AMAZING "INSIDE STORY" ON NEW EXIDE-IRONCLADS WITH POLYETHYLENE, CALL YOUR EXIDE SALES ENGINEER!

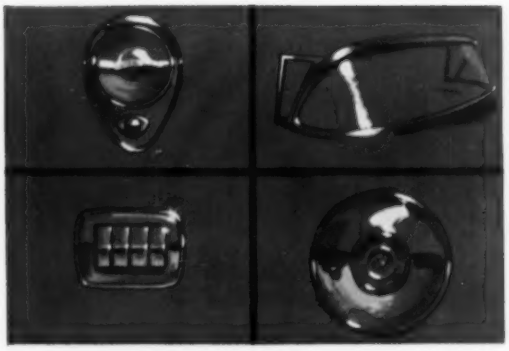
Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

modern design specifies stainless steel



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STAINLESS
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for automobiles



The beautiful bright molding and trim that style your car are made of non-corrosive, easy to clean Stainless Steel. Designers of automobiles and hundreds of other products specify Stainless Steel for its many valuable properties.

For the product you make today and the product you plan for tomorrow specify McLouth high quality sheet and strip Stainless Steel.



McLouth Steel Corporation
Detroit, Michigan

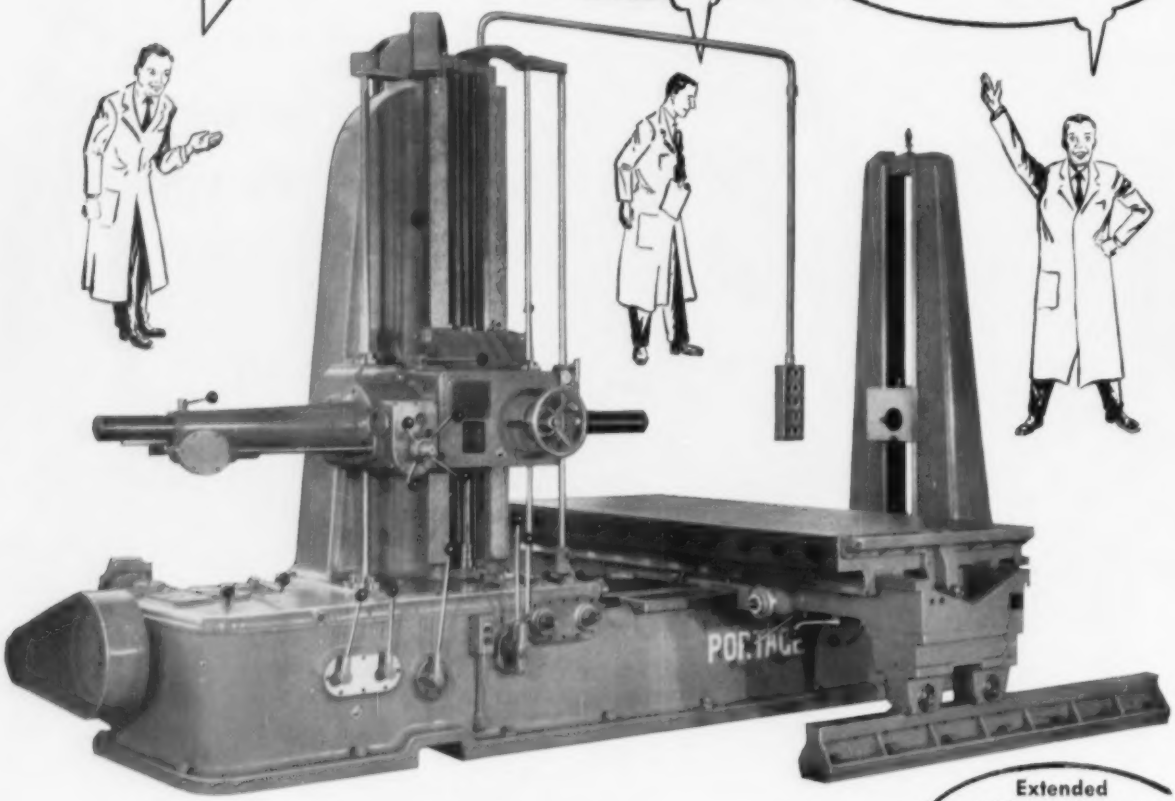
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CHECK THESE *Features...*

4" spindle diameter, precision machined nitralloy steel.

Pendent controls include spindle rotation, forward, reverse, jog forward, jog reverse and stop.

36 spindle speeds 8-1000 R.P.M. 18 Feeds.

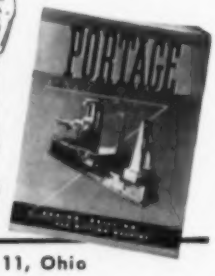


Extended table saddle with adjustable supports and runways makes it possible to handle the big jobs, too!

Unusually wide and deep base, cast entirely in one piece . . . offers excellent rigidity.







PORTAGE MACHINE PRICES START AT $31,358 COMPLETE. The PORTAGE Horizontal Boring, Drilling and Milling Machine is a precision built tool. Only the finest of materials and workmanship go into its manufacture . . . and at a comparatively lower cost. Get ALL the facts . . . write for literature and specifications . . . *TODAY.*

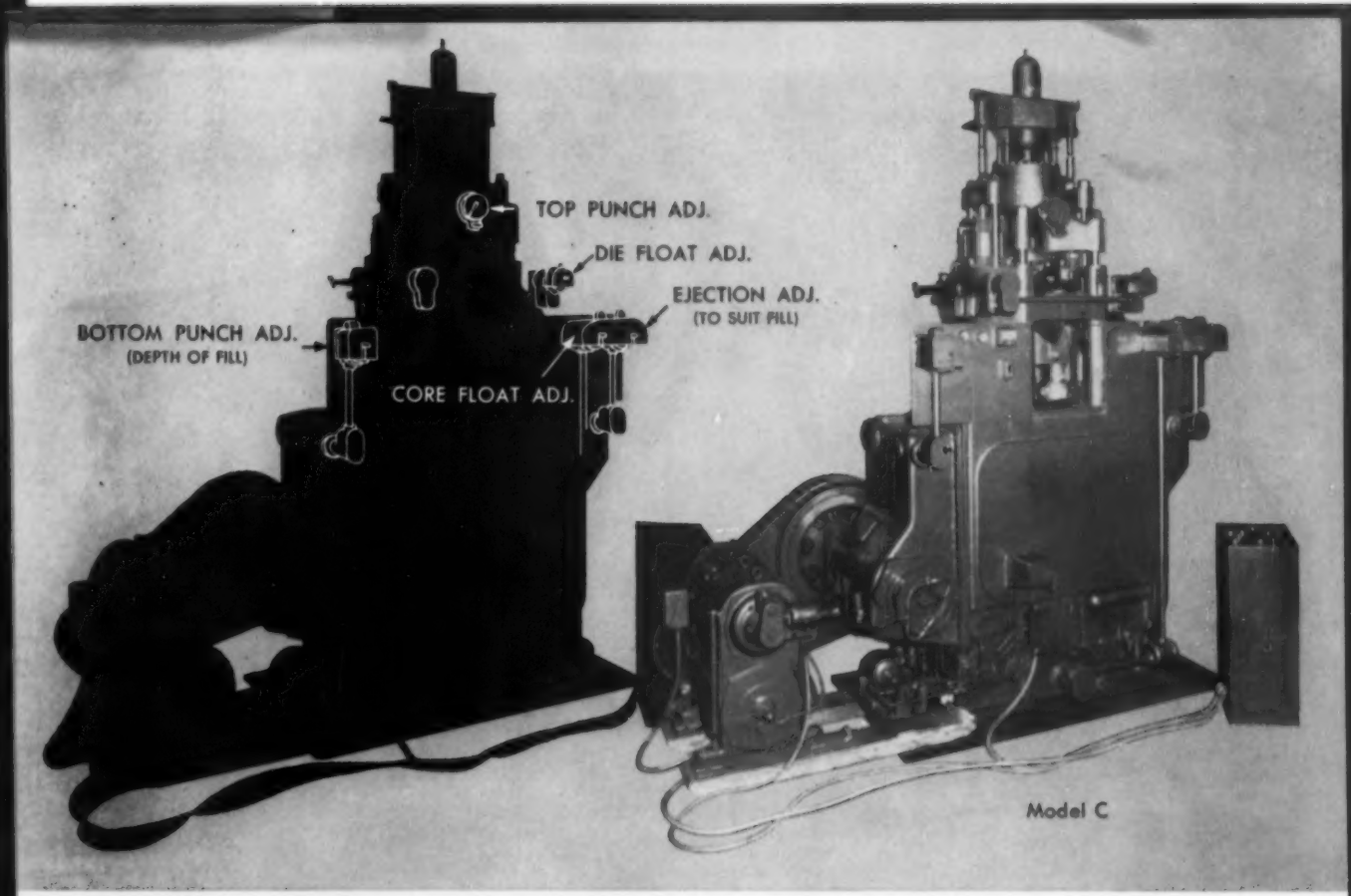
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BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916



INDIVIDUALIZED COMPONENTS of new Baldwin powdered metal presses make adjustments easy

It's mighty easy to make adjustments in density or weight in Baldwin's new Model "L" and "C" presses. That's just one of the results of a new concept of compacting powdered metals.

These revolutionary new Baldwin presses are not just remodeled heavy-duty pill presses. They have been designed expressly to meet your end product's needs. For example, instead of having combinations of actions, press components have been individualized. That enables you to make adjustments easily to fit any job.

Since there are no cams to change, many of the adjustments can be made while the presses are in operation. Also all controls are concentrated on one panel for easy supervision and adjustment. Two separate controls adjust the depth of fill and the stroke of the bottom punch. The relative position of the core rod to the die is also adjustable to aid in controlling the fill when making counterbored parts.

Further evidence of Baldwin's new concept includes such unique powder metal press features as . . . hydraulic heads, shuttle type feeders, independently floating die and core rod, automatic lubrication and variable cycling. It's no wonder that initial tests prove that these new Baldwin presses can out-produce competitive models by 200%, turn out compacts to closer tolerances and eliminate costly grinding operations.

You'll find more information and specifications on these new presses in our Bulletins 3101 (C) and 3104 (L). Write Dept. 4816, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pennsylvania.

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Eddystone Division

BALDWIN-LIMA-HAMILTON



When you want the best technical assistance "on your team," *use Bonderite under the paint*



Parker technical representatives average 12 years on the job.

The Parker technical representative who lives in and covers your area has a solid background of experience—an average of 12 years on the job!

● Many people tell us this is one of the most important things we have to sell, even though it doesn't cost our customers a red cent.

It's the knowledge and experience our organization has built since the introduction in 1929 of Bonderite, the first corrosion resistant paint base. It's the competence and practical understanding of our technical representatives. It's the cooperative attitude of our Customer Service people. It's the initiative and ability of our Research staff.

When you use Bonderite on your product, all these people go on your team to see that you get best results with greatest economy.

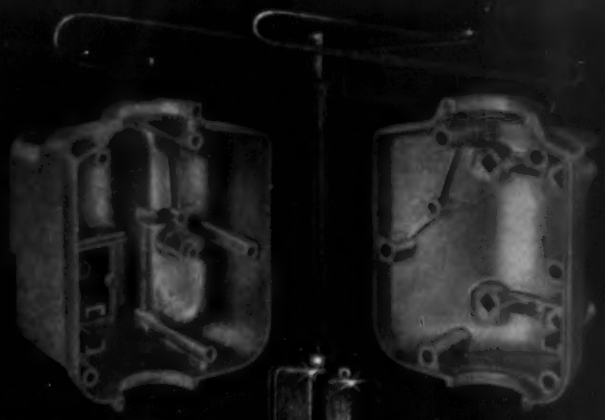
Want these good men on your side? Write Parker today!

**Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.*

PARKER RUST PROOF COMPANY
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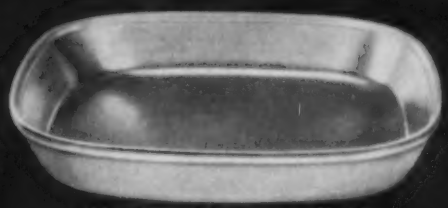
Since 1915—leader in the field

BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

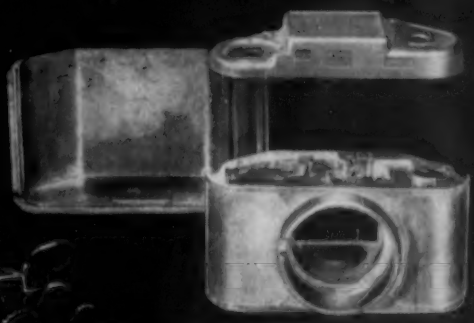


Zinc Die Casting—
Commercially Trimmed





Aluminum Permanent Mold
Casting—Machined & Velvaglazed®





Aluminum Die Casting—
Commercially Trimmed



Want more casting value per dollar?

Monarch pioneers in casting progress. Our casting and finishing facilities, unique in the industry, produce unusual casting performance. The job your casting must perform is economically accomplished with jobs we perform on the casting.

Illustrated are a few major industries capitalizing on Monarch's ability to guarantee top-value castings at factual, low end-cost.

MONARCH
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PIONEERS IN CASTING PROGRESS

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Aluminum Permanent Mold
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Aluminum Die Casting—
Commercially Trimmed

Aluminum Die Casting—
Commercially Trimmed



Q. Why does Blanchard grind its own machine parts on a Blanchard?



A. It's the only way we know to get highest quality at lowest cost!

Shown here are 117 different parts of a #18 Blanchard Grinder. 239 surfaces on these 117 parts were ground on a Blanchard, for the simple reason that *there isn't any better way.*

Everyone who uses Blanchard Grinders knows that Blanchard elements are machined with extreme accuracy . . . that they *have to be!*

Furthermore, Blanchard users everywhere would undoubtedly agree fully with these two actual statements recently made by customers:

"There is no greater machine tool money value than a Blanchard. It is the best buy we ever made".

"Until our Blanchard went to work, I never realized I could actually save so much, as compared to previous methods of machining flat surfaces".

If you do not own a Blanchard, we invite you to select some of your own components, and let us give you estimates to compare with your present quality control tolerances and machining costs. Chances are you'll find it will pay you to *"PUT IT ON THE BLANCHARD".*

P. S. You guarantee yourself full benefit from your Blanchard Grinders when you use the correct Blanchard abrasive wheels!



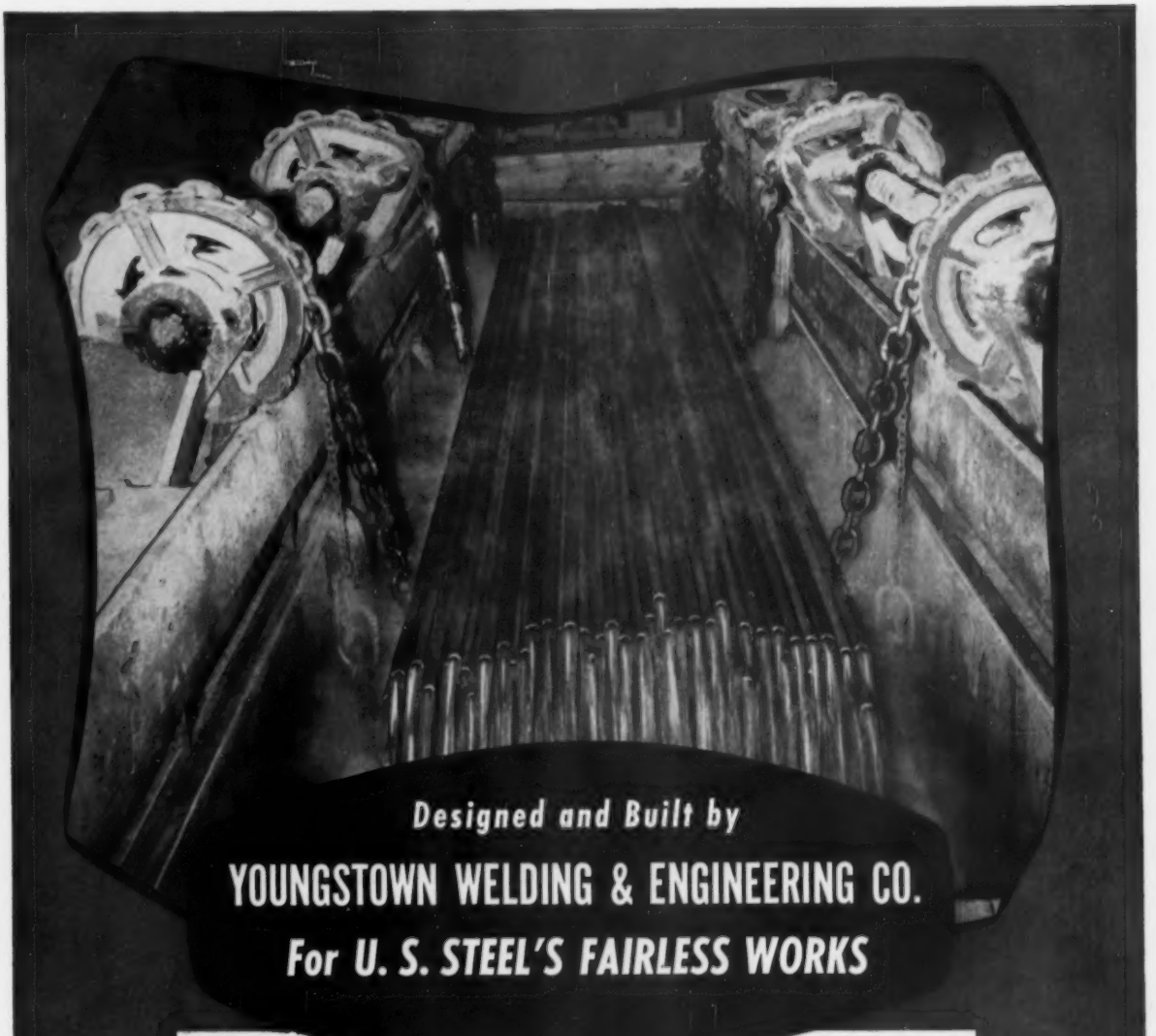
Send for free copies of "Work Done on the Blanchard", (fourth edition), and "The Art of Blanchard Surface Grinding".



PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.



Designed and Built by

YOUNGSTOWN WELDING & ENGINEERING CO.

For U. S. STEEL'S FAIRLESS WORKS

Three 15-Ton WELDCO MECHANICAL TUBE PICKLERS, like the one shown above, assure fast, efficient, low-cost pickling at the new Fairless Works. If you want uniform pickling, better finish, and big savings in manpower and maintenance, investigate WELDCO's complete line of Mechanical Picklers—for Bars, Tubing, Coils and Sheets.

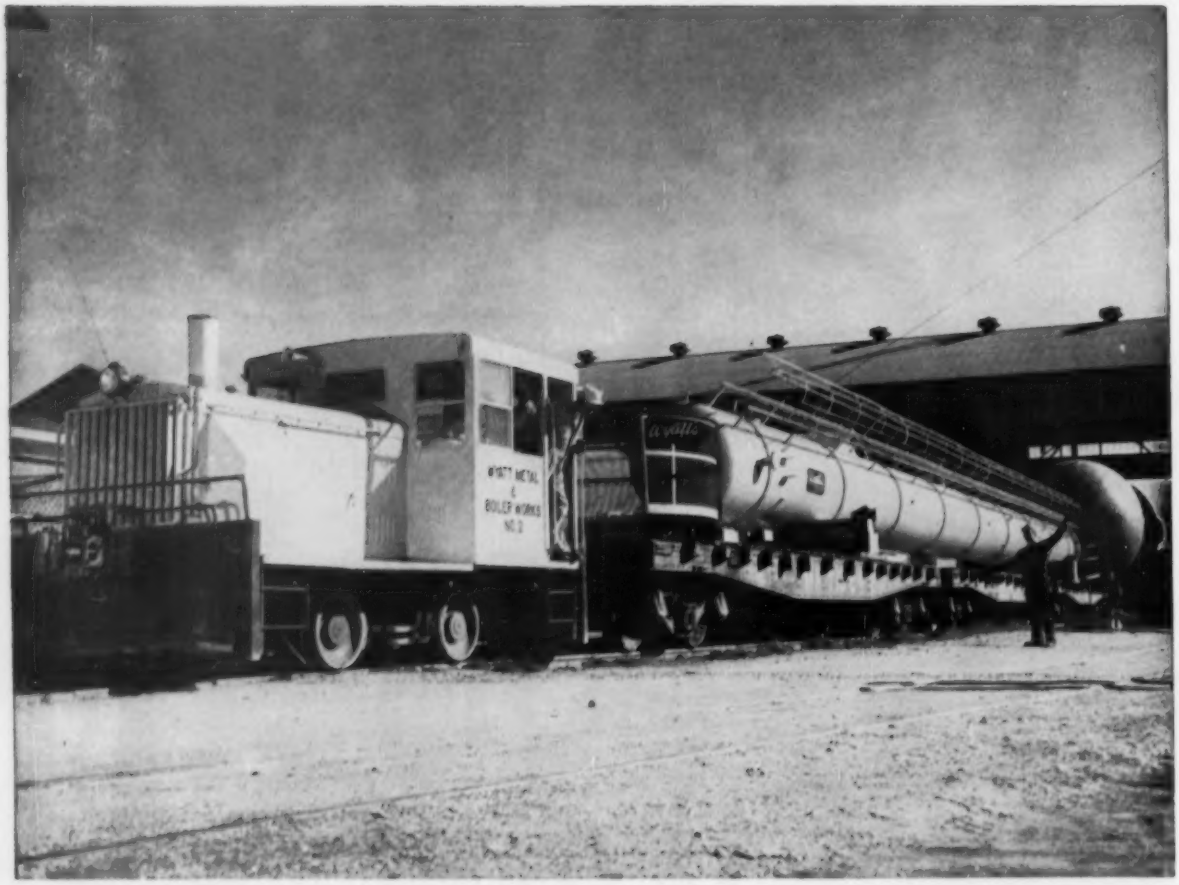
Other WELDCO Pickling Products include:

Hooks, Crates, Baskets, Racks, Chain, Steam Jets, and Accessories.

WELDCO

THE YOUNGSTOWN WELDING & ENGINEERING COMPANY

3762 OAKWOOD AVE. YOUNGSTOWN 9, OHIO



No down time in 16 months!

That's the record of this 20-ton Plymouth Diesel owned by Wyatt Metal & Boiler Works, Houston, Texas

This modern Plymouth operates approximately 45 hours a week, hauling, switching and spotting railroad cars in the plant. The operator praises the Plymouth Torqomotive* Drive because it eliminates shifting gears under heavy loads, assures smooth, steady power for peak efficiency, and reduces rough starts and coupling shocks.

"There just isn't anything we have found wrong with our Plymouth," says E. C. Jones, Vice President of Wyatt. "Efficiency in switching has doubled, and we have lost no time due to repairs or maintenance since we purchased the locomotive 16 months ago. It is far above anything we have had experience with."

If you are not enjoying the benefits of "Industry's Smoothest Switchers" write for illustrated catalog of the Plymouth line—models from 3 to 70 ton. Gasoline or Diesel. Mechanical or Torqomotive Drive. Also Diesel-Electric. PLYMOUTH LOCOMOTIVE WORKS, Division of THE FATE-ROOT-HEATH COMPANY, Dept. A-2, Plymouth, Ohio.

*TORQOMOTIVE DRIVE: PLYMOUTH TRANSMISSION COUPLED TO A HYDRAULIC TORQUE CONVERTER

PLYMOUTH® TORQOMOTIVES





Above: *Bed and Headstock are cast integrally to form an extremely heavy unit and to provide the rigid foundation for all types of work.*

Below: *Block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".*



ACCURACY THAT DOESN'T "WEAR OFF"

Here are two good reasons why you can count on the accuracy of Gisholt Turret Lathes—now and years from now.

One-piece bed and headstock, cast as a heavy, rigid unit, reduce distortion and vibration to a minimum. Headstock is jig-bored to insure—and maintain—perfect alignment of spindle and drive shafts, with ample metal to provide the most solid support possible.

Hardened steel ways are augmented by hardened steel strips secured to the ram saddle, as well as hardened steel gibs and clamps, making an assembly that is virtually wear-proof. Its accuracy is further preserved by force lubrication.

These advantages are yours for the long life of any Gisholt Turret Lathe. Ask for complete details.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*



GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

WATERBURY FARREL
FOUNDED 1851

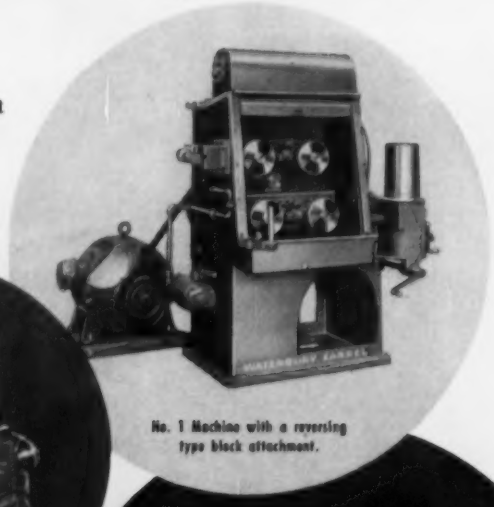
Custom-Engineered Upright Cone *Wire Drawing Machines*

★ **In 4 Sizes**

★ **With Drive, String-Up and Packaging Equipment To Fit *Your* Specific Requirements**

★ **And Precision, Quality Construction Throughout**

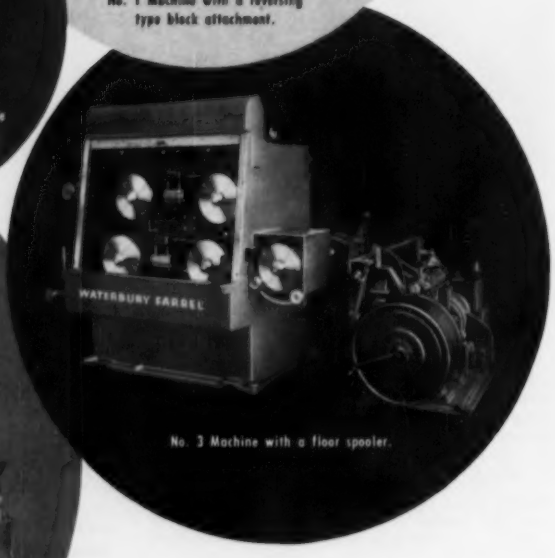
Here are four examples of Waterbury Farrel's long-proven ability to custom-engineer wire drawing machines for specific applications. The machine *you* need may call for another variation in design. For further information on the size and type of upright cone machine fitted to *your* exact requirements, contact Waterbury Farrel, today.



No. 1 Machine with a reversing type block attachment.



No. 2 Machine with a reversing type block attachment, adjustable finishing die and hand operated string-up.



No. 3 Machine with a floor spooler.



No. 4 Machine equipped with a cradle type floor spooler.

SPECIFICATIONS

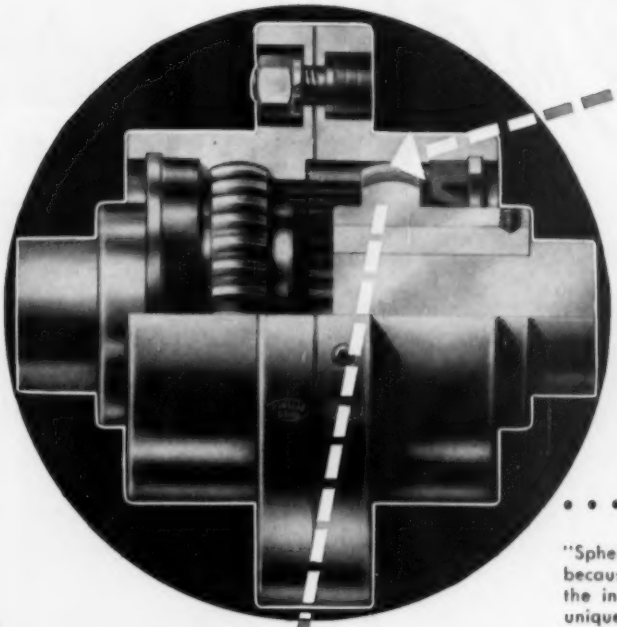
Size of Machine	No. 1	No. 2	No. 3	No. 4
Max. No. of Dies	16	14	12	13
Max. Starting Size B & S	#14	#8	#4	¼
Finishing Sizes, B & S	#26 to #42	#20 to #34	#14 to #26	#12 to #18

WF-26

WATERBURY FARREL
FOUNDRY & MACHINE CO.
Waterbury, Conn. U. S. A.
Sales Offices: Chicago • Cleveland • Millburn, N. J.



INVESTIGATE the advantages



SPHEREFLEX®

FLEXIBLE COUPLINGS

...and you'll buy them

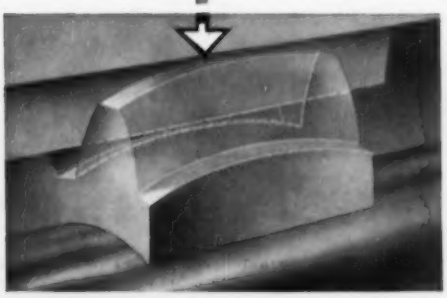
"Sphereflex" is entirely *different* than any other coupling, because the male teeth are cut on a "true spherical arc" and the internal teeth are cut with a "straight root" . . . This unique combination permits the curved teeth to constantly maintain a *full line of contact* with the internal teeth, *even when the coupling is flexed;* in addition, this feature makes it *absolutely unnecessary* to depend upon excessive backlash between coupling teeth, point contact or springs, in order to secure true flexibility. Size for size, "Sphereflex" Couplings will withstand higher horsepowers and greater misalignments than any other comparable couplings.

Standard "Sphereflex" Couplings will compensate for angular mis-alignment up to 3½° plus or minus on each coupling half, or a total of 7°, (special couplings are available for mis-alignments up to 14°). Due to this angular capacity, the "Sphereflex" Coupling can offer much greater parallel misalignment with minimum backlash. "Sphereflex" Couplings are priced competitively with ordinary commercial gear couplings.

When you buy "Sphereflex" Couplings, you secure the background of 64 years in power transmission engineering and experience, covering thousands of jobs in every line of industry and transportation.

If you have a Coupling problem, "Phillie Gear" Sales Engineers can help you to secure a cost-saving and effective solution . . . Phone, wire or write for our new coupling Catalog # C-560.

NOTE—
teeth are cut on a true spherical arc



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Industrial Gears & Speed Reducers • LimiTorque Valve Controls
Established 1892

ITEMS LIKE THESE AVAILABLE AT

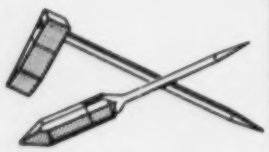
Chase® WAREHOUSES!



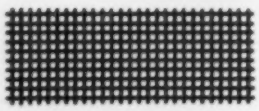
BRASS or COPPER RIVETS and WASHERS



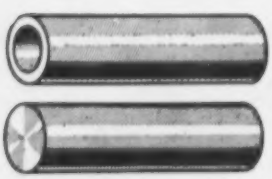
BRASS, COPPER, BRONZE COTTER PINS



SOLDERING COPPERS



INDUSTRIAL WIRE CLOTH



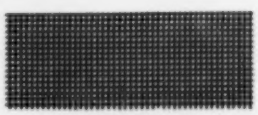
SOLID or CORED BEARING BRONZE



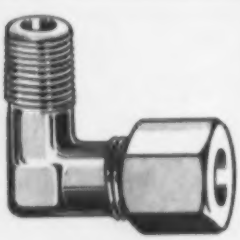
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CALL US FOR ANYTHING from Bearing Bronze Bars to Brass or Bronze Bolts...or other fastenings like those shown here for maintenance, repair, operating or production. Twenty-five Chase warehouses are located in major industrial centers from coast to coast. Phone the one nearest you. We can usually fill your orders from stock.

NEW! Chase's informative rod and wire movie, "IN THE CHIPS." Arrange for a free loan of this film by contacting the Chase warehouse or sales office near you. Write on your company letterhead, today!

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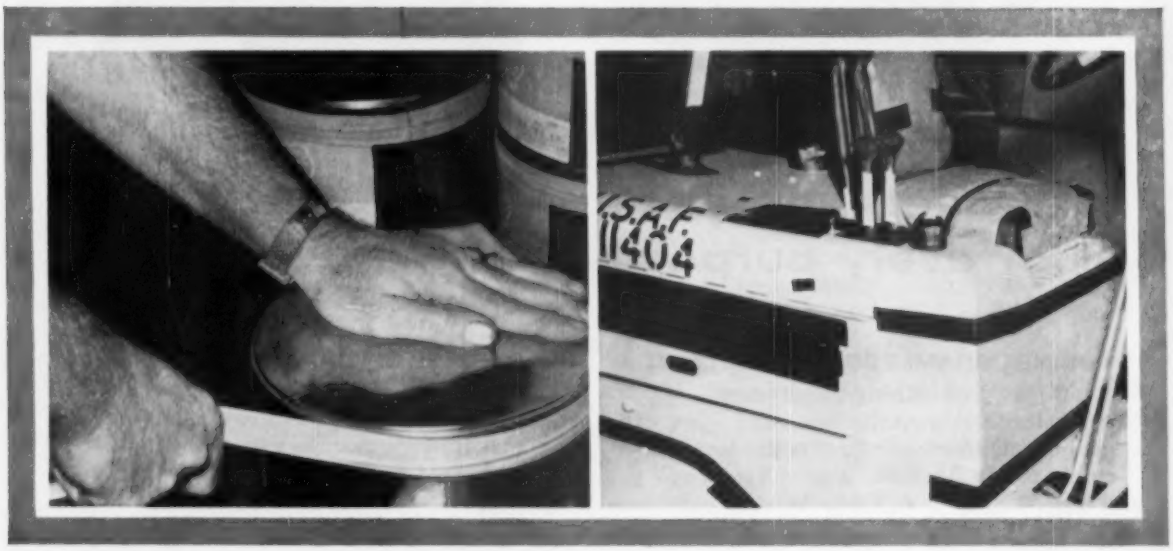
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CONTROLLED STRENGTH

KEEP PRINTING INKS MOIST, LIFT TRUCKS DRY



Here you see *Polyken* Tape being used in two different applications—each requiring a dependable, low-cost moisture barrier.

The cans of printing ink at the left are sealed to prevent the ink from drying out. The tape also protects the contents from dust and keeps the tops secure during rough handling and shipping. The durable cloth-backing of *Polyken* permits repeated use of the tape.

The lift trucks in the other picture—scheduled for overseas shipment—have a waterproof seal of *Polyken* Tape for protection against salt water damage.

In both cases, the ease of applying *Polyken* Tape right from the roll saves many man-hours. And because *Polyken* Tape *stays put*, less is needed for an efficient seal.

These cost-cutting advantages result from *Polyken controlled strength*—the right combination of backing and adhesive to do the best possible job *with the least possible tape.*

Whether your need involves sealing; protection in storage and shipment; wrapping and packaging; or a special requirement—you can depend on Polyken *Controlled Strength* Tapes.

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INDUSTRIAL TAPES

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hollow or solid



a steel tube or bar for every purpose

TUBING: SEAMLESS AND WELDED

Whatever your tubing requirement—whatever kind and quantity you need—you can get quick delivery of a quality product with a single call to Ryerson.

That's because Ryerson stocks are the nation's largest, including more types and sizes, more tonnage, than any other source. And Ryerson service facilities are unequalled, too.

Hack saws, band saws and equipment for production lathe cutting and chamfering assure quick service on your orders. In addition, a staff of tubing specialists puts years of experience to work on your problems of tubing selection and fabrication. So call Ryerson for everything in tubing and tubing service.

In stock: Cold drawn and hot rolled seamless mechanical tubing, hot and cold rolled welded tubing, hydraulic and cylinder tubing, structural tubing, etc.

COLD FINISHED BARS

Careful handling, accurate cutting, vigilant inspection—these are just three of many ways in which Ryerson assures you of the highest quality in cold finished bars.

Stored in temperature-controlled rooms, spark-tested to guard against mixed steels, Ryerson cold finished bar stocks include rounds, squares, hex's, flats—screw steel, accuracy stock, turned, ground and polished shafting, Ledloy for fastest machining—everything you need. And even the hard-to-get intermediate sizes are on hand.

To help you select the best cold finished bar for each application, we have just published a simplified guide showing the comparative strength, cost, machinability, workability, etc. of all commonly used types. Write for your copy and call Ryerson when you need high quality cold finished bars.

RYERSON STEEL

In stock: Bars, structurals, plates, sheets, tubing, alloy and stainless steel, reinforcing bars, machinery & tools, etc.

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The Iron Age Newsfront

Look For Higher Furnace Output

A new method for removing sulphur reportedly will increase blast furnace output by 20 pct. Said to be faster and more economical, it will utilize caustic materials similar to the sodium carbonate now used. However, material will be better controlled, eliminating dangerous fumes and rapid erosion of refractories. Still under development, it is expected to be announced next year.

Administration Puts Lid On Spending

No big government spending programs will be approved between now and next July. The administration is driving hard for a balanced budget and word is out to federal bureaus to forget about starting new programs. In addition, Secretary of the Treasury Humphrey will use every weapon to trim "fat" from existing programs. Republican strategy is to go to the convention in San Francisco next year with all '52 campaign promises fulfilled, including the tough budget-balancing pledge.

New Dust Collector Passes Test

One firm using a coal fired boiler has found a new type dust collector highly satisfactory. In fact so much so that after only two months of operation, it has ordered a second installation of the multi-tube centrifugal separator. Used under a variety of operating conditions, it has in all cases met or exceeded smoke control regulations.

Having Horsepower Problems

One of the "Big Three" automakers has been trapped on the amount of horsepower that can be developed in the V-8 engine it now makes. Plans call for a completely new engine in 1957 and machine tool orders have already been placed.

Get Complete Inspection On Fast Line

Early next year, a fully automatic inspection unit will be placed into operation on bar stock and tubing zipping along at more than 200 fpm. The magnetic analysis equipment picks up any slight deviation from standard and trips a chute for rejects. It'll verify chemical composition, detect flaws and check dimensions—including wall thickness, and inside and outside diameters of tubing.

Show Provides Stimulus

Although the next Machine Tool Show isn't scheduled until 1960, there won't be much lull in design activity between now and then. Reason is that visitor reaction to competitive lines at last September's show was very revealing to builders. Some found their best design features not quite up to accomplishments of rival firms. Result is quiet but feverish current activity to "catch up."

Tool And Die Makers Badly Needed

Large and small metalworking plants alike are finding the pronounced shortage of tool and die makers a mounting problem. Many firms, unable to get skilled employees, are working present staffs longer hours and paying greater overtime costs. Larger firms are stepping up apprentice training programs and upgrading less skilled workers wherever possible.

Diecast Engine Blocks Successfully

Aluminum diecast engine blocks for 6-cylinder cars have been produced successfully in what is described as the world's largest diecasting machine. The trimmed casting will weigh 43 lb, a saving of about 132 lb over a gray iron casting. Since all 129 holes are cast to size, no drilling is necessary. The blocks, which can be made at the rate of 30 to 35 per hour with one machine, will undergo extensive testing. Development of a V-8 block has also been started.

Scrap May Go Higher

Scrap prices are now soaring to record highs, may go still higher before the peak is reached. Purchases for steel conversion, combined with continued record steel production, broke through a price line that had been held in the face of mounting domestic and export demand.

HOW CMP RESTRICTED SPECIFICATION

COLD ROLLED STRIP STEEL CUTS MATERIAL AND END-PRODUCT COSTS . . .



Putting a stop to troubles with cold rolled strip steel has long been the specialized business of CMP.

By working to restricted specifications for size, characteristics and finish, CMP precision rolling and processing has helped in many ways to reduce slow downs in production with flat rolled steel.

The danger of not having steel with the "working qualities" that will keep up with todays high speed automatic machines can be eliminated. In many cases a CMP restricted specification strip has simplified tooling and stepped up machine speeds 25% or more.

And when the free flow of CMP strip is moving through your equipment without difficulty you'll know why your end-product costs are at the right level — why it pays to always check CMP for the right specification wherever cold rolled strip steel is needed. Your inquiry is invited.

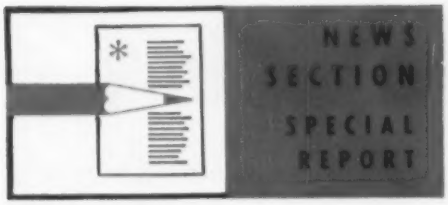
CMP WHERE YOU CAN GET SPECIFIC SPECS. FOR SPECIFIC JOBS

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Keep an Eye on Machine Tool Backlogs

New orders stretch out deliveries . . . Trend to increased good business points to longer waits for new tools . . . New capital outlays for expansion provide stimulus . . . Seek improved production.

◆ MOUNTING BACKLOGS and lengthening delivery dates—this is the machine tool picture in the last month of 1955.

Backlogs are well past the six months point and orders continue to exceed both shipments and productive capacity, the result of a second half surge in machine tool buying.

This means that machine tool buyers will have to wait longer for delivery of newly ordered tools. Plants tooling up for new capacity will find this situation extending well into 1956 on the strength of new outlays for capital goods and industrial expansion.

Builders hesitated to increase their own productive capacity on the strength of the first increase in orders in summer. Now they consider second or third shifts in an effort to keep backlogs from getting out of hand.

Underlying Causes

Immediate cause of the sharp increase in machine tool buying may have been the Chicago Machine Tool Show. But while the Show triggered the buying spree, there are basic factors that point to continued strong demand for tools in the months ahead.

They include (1) automotive orders that began to spurt last July on completion of tooling plans for 1957 model changes, (2) necessity for mass production industries to improve manufacturing methods in the face of mounting labor costs, and (3) continuing good business that is forcing many industries to increase their productive capacities.

Lengthening backlogs will be aggravated by an Air Force announcement that it will spend $52.9 million to buy new machine tools for speeding aircraft production.

Air Force Buys

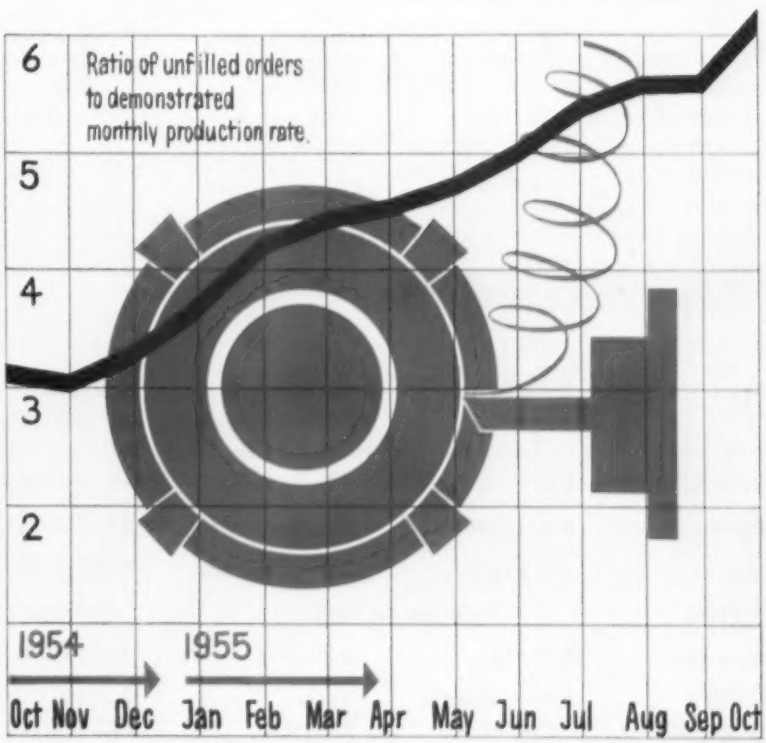
The new machine tool program is aimed both at increasing productive capacity of the aircraft industry and at reducing production costs. The new buying will be "separate and distinct" from the machine tool stockpiling program.

An IRON AGE survey of major machine tool producing and market areas shows a uniform picture of increasing backlogs, but with significant variation among types and classifications.

Builders point out that customers can get faster delivery on standard types and with standard accessories. The catch is that most of the big users, automotive in particular, require special tools or special accessories.

In heavy milling and broaching machines, automatic lathes and

Machine Tool Backlogs



transfer machines, delivery dates are as far as two years ahead. For standard lathes, surface grinders, milling machines, some turret lathes, jig borers, and other standard tools, delivery is as short as a few weeks to a few months, probably six months at the most.

In between are the planers, production or special drilling, boring and tapping equipment, vertical boring mills, and broaching machines.

Orders for most metalworking tools showed marked increases in July, continued to mount throughout the third quarter, and in October jumped to the highest point since July, 1952.

Conservative builders were first inclined to consider the jump in new orders as a short term thing. now look ahead to increased or at least continued good business next year.

One major machine tool builder says its January orders will continue at the same rate as October and November, looks for sales next year to jump 25 to 30 pct over this year.

Plans Third Shift

"We are quoting 37 weeks delivery on our smallest lathe and on special crank shaft lathes we are out to 1957 delivery," reports another large builder. This same builder quotes heavy lathe delivery at 24 to 30 months, plans to get a third shift ready.

This reflects the hesitation of builders to boost capacity unless extended ordering is assured. Adding to productive capacity not only is expensive, it is aggravated by a serious shortage of skilled labor and engineering personnel. But lengthening backlogs and competition appear to be forcing increased machine tool production.

Delivery Dates

Based on surveys of builders and machine tool users, here is a cross section of typical machine tool delivery patterns.

In the Midwest:

Heavy milling machines, 1½ year backlog, eight months delivery on stock models, over a year on specials; transfer type tools, two years backlog and delivery; broaching machines, eight to nine months delivery; planers, slotting machines, six months backlog, nine months delivery, one year to 18 months for special equipment.

Production or special drilling, boring or tapping equipment, one year backlog and delivery; screw machines, five to six months backlog and delivery; light general purpose drill presses, four weeks; standard gear hobbers, four months backlog, three months delivery; automatic gear hobbers, seven months backlog, six to eight months delivery.

Horizontal boring mills, five to eight months delivery, eight to 12 months for vertical boring mills; turret lathes, six months backlog, five months delivery; milling machines, eight to 10 months backlog and delivery.

In the East:

Typical delivery dates are: vertical turret lathes, three to nine months; vertical chucking machines, six to 10 months; horizontal boring, milling and drilling machines, three to six months; automatic screw machines, two to three months; gear shapers, about one year.

Sales Climb

In the third quarter machine tool buying, orders for cutting tools averaged $65 million per month, compared with $62 million average in the second quarter and $43 million in the third quarter of last year.

Unfilled orders continued to mount, rising to $340 million at the end of the quarter, reflecting a 6.2 months backlog.

Breaking orders down by type of tool, of the $195,528,000 in new orders reported to the U. S. Dept. of Commerce, boring machines accounted for $23,311,000, broaching machines $6,699,000, drilling machines $24,555,000, gear cutting and finishing machines $12,415,000, grinding machines $32,109,000, lathes $47,082,000, milling machines $33,311,000, planers $1,721,000, and others $14,916,000.

New orders for forming and shaping tools also increased in the third quarter, continuing a trend that started in late 1954. New orders were $123 million, reflecting a 20 pct increase. Hydraulic presses accounted for the bulk of new orders, with a total of $94,542,000 in new business for the month.

The recent tool procurement announcement of the Air Force seems to spell out the direction of future buying. The Defense Dept. has apparently decided against long range stockpiling because of the rate at which tools are outmoded.

But the military services will continue to buy tools for current use if it can be shown that new models will make a big difference in the speed and cost of defense production. Idea is to avoid criticism.

Machine Tool Delivery Outlook

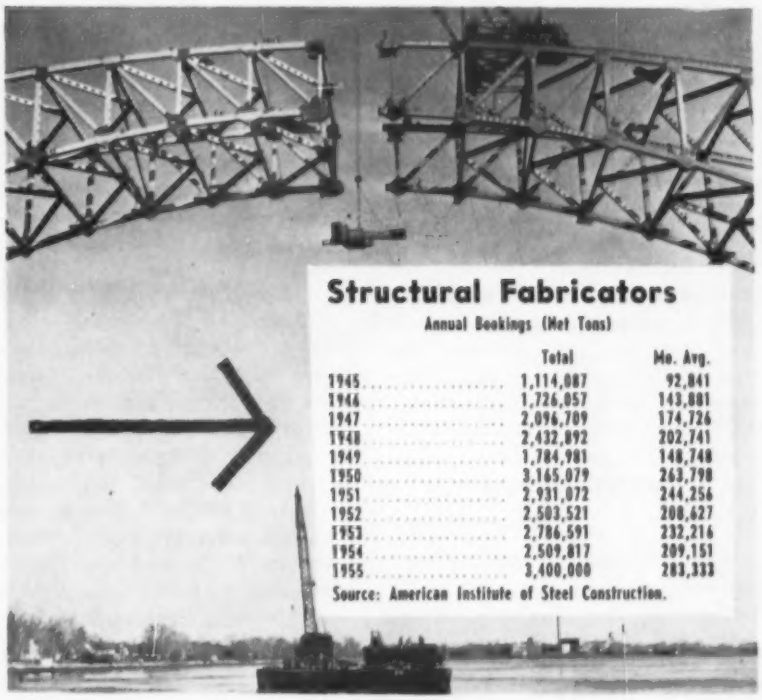
Type	Backlog	Earliest Delivery	New Orders 3rd Quarter
Broaching	6 to 9 months	4 to 8 months	$6,699,000
Boring	6 to 12 months	6 to 7 months	$23,311,000
Milling	1½ years	8 to 12 months	$33,311,000
Turning	Depends on Type		$47,082,000
Grinding	4 months	2 months	$32,109,000
Drilling	6 to 12 months	Varies	$24,555,000
Gear Cutting	4 months	4 months	$12,415,000

FABRICATORS: Straining Under a Boom

1956 bookings up 45 pct over 1954 . . . Deliveries trail as much as 90 days . . . Delay of 120 days good possibility . . . Lack of steel still biggest headache . . . Carryovers heavy—By K. W. Bennett

◆ BUSINESS BOOMS aren't all fun. Structural fabricators are smiling, but the smiles are getting strained, even though bookings for 1956 business are 45 pct above 1954.

Principal pinch is steel. Last year, though steel was readily available, fabricators hacked into their backlog. The backlog shrank (average monthly tonnage booked in 1954 was 209,151 tons, as compared with a monthly average of 232,216 tons in 1953), but tonnages shipped rose to near record heights.



Structural Fabricators

Annual Bookings (Net Tons)

	Total	Mo. Avg.
1945	1,114,087	92,841
1946	1,726,057	143,881
1947	2,096,709	174,726
1948	2,432,892	202,741
1949	1,784,981	148,748
1950	3,165,079	263,798
1951	2,931,072	244,256
1952	2,503,521	208,627
1953	2,786,591	232,216
1954	2,509,817	209,151
1955	3,400,000	283,333

Source: American Institute of Steel Construction.

Reverse Switch

This year business took a reverse switch. In March (IRON AGE, March 24), structural fabricators found new orders coming in at a faster clip. A few hardened veterans tested the trade wind, decided to lay in heavier inventories of steel in anticipation of trouble ahead. They were right. Incoming steel began to decline and the volume of incoming business continued to climb. At the end of September the American Institute of Steel Construction reported the month as the fifth in which new business bookings exceeded 300,000 tons as compared with the 209,000 ton 1954 monthly average. Shipments continue to climb through September of this year. But after July fabricators dug into stocks.

At present, fabricators are running 30 to 60 days behind on delivery dates, and backlogs for the industry range from 8 months to a full year. In theory, fabricators at the lower end of the backlog range could wipe out their backlogs in 6 months, but in practice find that shortages of steel add a minimum of 60 days to time required to wind up the jobs on hand. With incoming steel dropping in first quarter by 20-40 pct as carryovers are cancelled, the backlogs continue to grow. Warehouse steel is being purchased in increasing quantity.

And though scattered fabricators speak confidently of getting more steel in 1956, few can say where it will be gotten. Confided one, "Why, when they get done deducting our carryover we're going to get only 60 to 75 pct of the steel in first quarter that we counted on. We booked fabricating jobs to cover all the steel we thought we were going to get."

Said another: "We'll get about one-third the steel in 1956 that we received in 1955." These statements are not rash. Some will get even less.

Most agree that the critical period, from a steel standpoint, will come late in first quarter. And though increased mill output of structurals is definite for 1956, the chances of this increase being felt in first quarter seem slight. Some admit delays in their own deliveries of fabricated steel may stretch to 90 days. Delays of 90-120 days are quite possible.

Many Worries

Though currently the big problem, fabricator difficulties aren't strictly confined to steel.

Net profits dropped in 1954 as the fabricator bid in a stiffly competitive market; was caught between the millstones of advancing materials-and-labor costs and sharp-pencil pricing of his own product. Price advances of 20-25 pct are now common, will certainly become general in 1956.

UNIONS: Whose Welfare Do You Mean?

Probers hear of union raids on pension and welfare funds . . . New laws not the answer, says John L. Lewis . . . He calls for self-policing and prosecution of the "human jackals."

♦ BIG INDUSTRY and big unions are telling Congress that no new laws are needed to control abuses of union pension and welfare funds.

Vigorous enforcement of existing labor, fraud, and criminal laws could solve the problem, they say.

A Senate labor subcommittee, headed by Sen. Paul Douglas, D., Ill., is probing into the welfare and pension fund problem. So far, it has turned up some evidence of alleged fund "raiding" and some data which should be useful to the auto and steel workers in next year's bargaining.

What's Needed

The subcommittee has no legislation before it now. But indications are that it is considering proposing laws requiring audits and public disclosure of joint union-management funds to prevent "raiding" and other abuses.

John L. Lewis, venerable boss of the United Mine Workers, says what is needed is for U. S. attorneys to take vigorous action under existing laws to punish "human jackals who feed" from union welfare funds.

Against Federal Laws

"If some of these labor organizations would abandon their holier-than-thou attitude, forget what they are going to do for the rest of the world, and put their own house in order," he says, "welfare plans might have a better chance to live." But no new laws are necessary, he contends.

Enders M. Voorhees, chairman of the finance committee of United States Steel, agrees generally with Mr. Lewis on that point.

He suggests that if new laws are needed, the states should handle it by extending existing insurance and banking regulations. There are too many different types of plans for one federal law to cover, he says.

Sen. Douglas, insisting that union members have a right "as a matter of equity," to all information regarding these plans, overruled objections by General Motors Corp., and will make public figures on cost and reserves of the firm's huge pension and welfare plan.

Officials Argue

U. S. Steel, following GM on the stand, volunteered some of the same type of information, apparently hoping to head off a similar clash with the subcommittee.

GM officials argue that the company and 18 unions have up to now been bargaining only on benefits and amounts of employee contributions when it comes to pension and welfare matters.

If reserve and cost data is made public, they complain, it will open the way for union demands for bargaining on costs of the program, and possibly higher benefits based on the amount of the reserve—built up to take care of expenses many years from now.

There are hints that parts of the hearings are aimed at helping unions get information and possibly embarrassing business, as well as uncovering abuses of the welfare funds.

Always in the background at hearing sessions is next year's election contest. Both sides realize only a few words of news reports register on the public. No one wants to get tagged management's tool or labor's persecutor.

How Unions Manage Welfare Plans

Testimony before a Senate labor sub-committee studying management of union pension and welfare plans, points up startling difference in how various funds are administered. Consider these two.

▪ AFL United Automobile Workers Local 286, Chicago— Collects $6.15 a month from each of 3500 auto workers for an insurance fund. Holds out $1.00 for the union treasury, plus another 4 pct for administration. Union president, Angelo Inciso keeps all union books. He is president of the company that handles the union insurance account. The union allegedly has collected $37,000 in employer contributions which were not passed on to the insurance fund.

▪ United Mine Workers, Ind.— Union boss John L. Lewis testifies that his massive welfare fund, formed nine years ago, is run by representatives of union and industry. It has paid out over $750 million in benefits; has a $100 million reserve; runs 10 hospitals for miners. Administrative costs run about 2 pct of receipts compared with 6.8 pct for Blue Cross. The mine operators praise the fund for "low administration cost" and for "the meticulous honesty and integrity" of the trustees.

NEW WIRING: Sells Appliances

Utilities are spending $4 million on adequate wiring promotion . . . Experts say 80 pct of homes are electrically starved . . . Boost appliance sales—By D. G. Picinich.

◆ AT LEAST 68 utilities will spend over $4 million this year on adequate wiring promotion.

A large eastern firm is upping this year's budget to $170,000 as against $2500 spent in 1954. Sizable funds are being set aside for transit system card displays, billboard posters, films, TV and radio programs.

According to electrical industry experts, at least 34 million homes—or about 4 out of 5—are electrically starved. They're drawing more current than present electrical systems can properly handle. In many cases, the industry warns, this means overheated wires and fire hazards.

Correspondingly, it's pointed out, when voltage drops on overburdened circuits, appliance operations usually become erratic, performance falls off, motors and other equipment burn out. A recent survey by Consolidated Edison Co. shows that despite this summer's record heat, New Yorkers turned back to appliance dealers 25 pct of the air conditioners bought. Reason: Their present wiring networks couldn't handle the extra load.

Need 100 Amp Service

Just a few years ago, a 30 or 60 amp service entrance (includes the exterior cable or wires to the main power line together with the fuse box) was considered adequate to meet an average home's electrical needs. Today, electrical associations, utilities, wire producers, and appliance makers are together spending millions promoting the need for a 100 amp service entrance hookup.

Today's more than 50 commonly used appliances pose electrical demands undreamed of 20 years ago. One industry estimate is that the rewiring market over a 5-year period is worth $5 billion. It's estimated there's another $3.5 billion market for the 5 million new homes slated to go up in the next 5 years.

This means, says the industry, that where now the average subwired home can use only $1000 to $2700 worth of lighting and appliances, a 100 amp residence could safely handle up to $5000 worth. The potential gross volume in extra business for electrical contractors is estimated at $100 million annually in the new-home field alone.

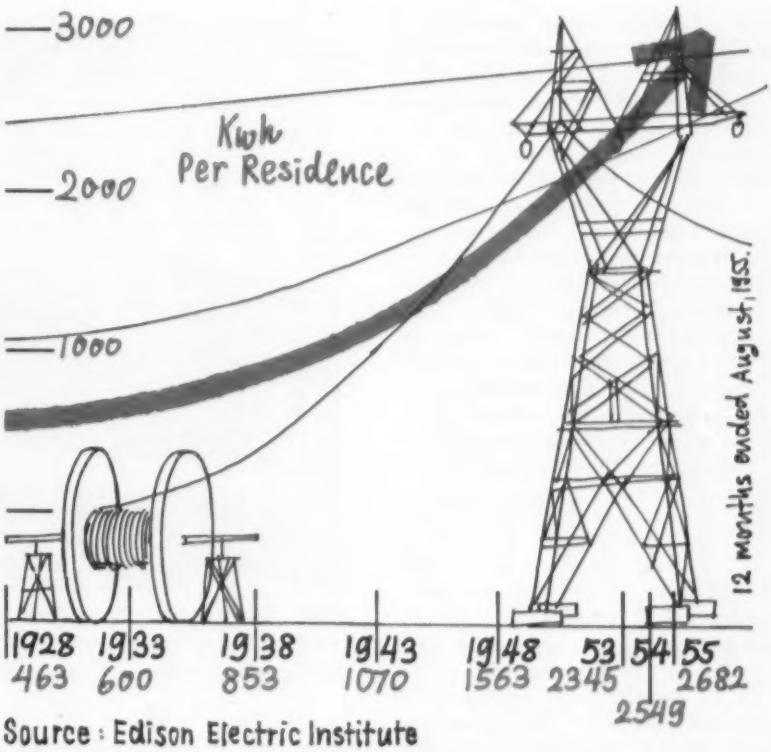
Reasoning is that as more wiring and appliances are sold, there will be a tremendous market for generating, transmission, and distribution equipment.

Programs Involve Millions

Adequate wiring is big business today. Con Edison notes that over the past two years its investment in equipment and labor comes to over $50 million, has opened up a bigger market for appliances.

Wire producers such as Kennecott Copper Corp. and Anaconda Wire & Cable Co. are widely advertising the more comfortable living aspects of 100 amp installation. Both Owens Corning Fiberglas Corp. and Allis-Chalmers Manufacturing Co. plug the need for adequate wiring to keep appliances working efficiently, more economically.

Chicago's Commonwealth Edison Co. launched its wiring modernization program early this year. It's aimed at one, two, and three family homes still equipped with outdated 120 or 240-volt wiring that needs replacing.



Source: Edison Electric Institute

Rapid Rise in Electrical Living

EXPANSION

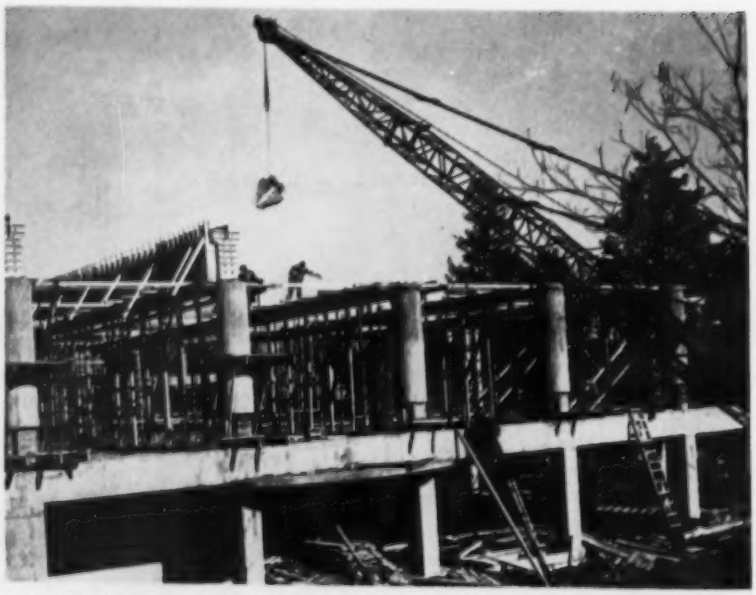
CAPITAL GOODS: Industry Can Pay

Amortization-depreciation, retained earnings will pay for 90-95 pct of projected expansion expense . . . External sources will make up the difference . . . Bill for decade will be $443 billion.

◆ CAPITAL goods spending in the next 10 years will approach $443 billion. This year alone U. S. business and industry will lay out $32 billion. By 1965 spending will have been stepped up to an annual rate of over $48 billion.

Will the money be available? And where will it come from?

Machinery & Allied Products Institute says 90-95 pct of it will come from internal funds, a combination of corporate depreciation - amortization and retained earnings. The balance will be financed by external sources; security issues, mortgages, bank loans and accrued tax liabilities.



NEW factories and plants along with the machinery and equipment to fill them will be springing up in increasing proportions over the next decade. MAPI estimates they will cost industry a total of about $443 billion.

Internal Contrast

This is in sharp contrast to the postwar decade when capital funds from internal sources were well below total capital goods spending.

The big difference will be in funds accounted for by amortization-depreciation. Because of the low level of installations during the war period, the end of fighting found a low stock of depreciable equipment. In 1947 this source accounted for only 30 pct of new equipment and plants, and as late as 1951 only 42 pct.

A plateau reflecting the return of economic stability is expected for the 1955-65 period with amortization-depreciation paying for about 65-70 pct of capital expansion. A slight dip is expected by MAPI in 1962 when amortization for tax purposes will expire for a large segment of capital goods.

With all but about $10 billion annually coming from amortization-depreciation, the strain is definitely off the retained earnings as a capital goods expansion financing source.

In contrast to the other internal source, retained earnings are difficult to project, says MAPI, because they depend on such variables as yearly corporate income, extent of federal and state corporate taxes and amount needed for overhead and local expenses.

Before the Korean War, corporate taxes were about 38 pct. During the emergency the amount taken by the government rose to 52 pct in addition to an excess profits tax. Currently the figure is 52 pct, but that would definitely change with any upward or downward trend in the national economy, as would so called fixed overhead.

But, assuming that profits will continue on a gradual upcurve and that the portion retained will follow, $7.5 billion will be assigned to capital investment in 1955. MAPI expects funds available from this source to gradually increase to $10 billion in 1965.

Prospects for the remaining 5 to 10 pct from external sources are excellent, according to MAPI. Over the decade just drawing to a close, funds from outside sources made up the difference between total money needed and that which was obtained from internal sources and left a balance of $37 billion. If this pace is merely maintained, and there is a good possibility of it increasing, it will be more than required.

MAPI concludes that barring any unusual depression or inflationary period, the outlook for capital goods expansion in the next decade is excellent—tremendous cash outlays will be required but the funds will be available.

METAL POWDER: Bullets to Bearings

Iron powder is three times ahead of last year's shipments . . . Growth tied in with new uses in addition to basic markets . . . Copper also grows in markets . . . Big use of lead powder is in bullets—By G. G. Carr.

◆ METAL POWDER producers are smiling happily these days. Domestic shipments of their chief product, iron powder, are running almost three times last year's levels. Total shipments, including imports, are almost double 1954, the previous record.

Shipments this year will be about 30,000 tons; roughly 20,000 tons of it domestic production. In 1954, shipments were slightly under 18,000 tons, and domestic production accounted for under 8000 tons. Despite a threefold increase in domestic production this year, imports have had to stay at about last year's levels—about 10,000 tons—to meet the heavy demand.

The long-term growth is even more dramatic. In 1943, domestic shipments were slightly over 2000 tons. (Imports that year were very small.) This means iron powder consumption has increased about 15 times in the past 12 years.

Where It Goes

Of the more than 20,000 tons domestically produced this year, about 9600 tons will be used in bearings and parts, the largest single use. Magnetic cores will account for about 1100 tons, and friction materials about 120 tons. The remaining 9600 tons will go into miscellaneous uses.

The trade believes that the second largest use of iron powder is as a component of the flux coating on welding rods. Third largest use is in the cutting and scarfing of steel.

Of all iron powder shipped in 1954, 84 pct had a range in price of 7¢ to 12¢ per lb for an average of 9.8¢ per lb. Seven pct was sold within a range of 12¢ to 15¢ per lb and the balance or 9 pct was valued at over 15¢ per lb.

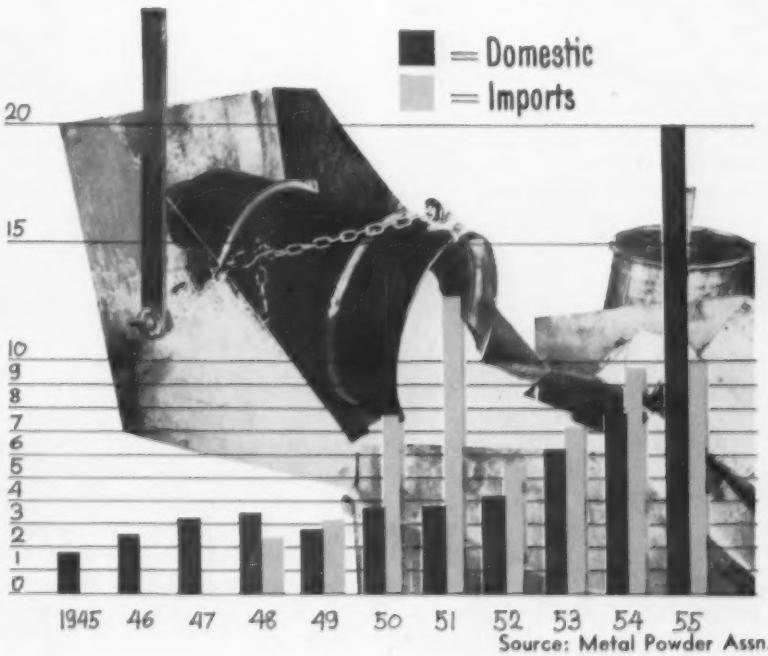
Copper powder, second largest product of the metal powder industry, is also growing substantially, although not so spectacularly as iron powder. Shipments this year will be about 12,000 tons, compared with under 10,000 tons last year and just under the record year of 1950.

Bearings and parts consume the largest amount of copper powder output, taking 79 pct in the last nine years. In the same period, friction materials accounted for 7 pct, graphite metal brushes 5 pct and miscellaneous uses 9 pct. The percentage of total production consumed by these classifications has not shown any appreciable change over the years. But unfortunately for the copper powder producers, they have not yet been able to develop any spectacular tonnage uses similar to welding rod coatings or cutting and scarfing in the iron powder field.

The only other metal powder on which background data are available is lead. This powder has shown steady growth with 1954 shipments about three times those of 1946. Shipments this year will amount to about 3500 tons, exceeding all previous years but 1954, when over 5000 tons were shipped. Ordnance traditionally accounts for a large share of lead powder consumption: the bulk of 1945's record tonnage, for example, was consumed as frangible bullets.

Solder powder is currently being shipped at the rate of 1000 tons per month.

Metal Powder Shipments



Source: Metal Powder Assn.

◆ AIR FORCE'S new wind tunnel at Tullahoma, Tenn., can simulate

GM: It's Tough to be the Biggest

Senate investigators hear that GM is tough on competitors . . . GMAC share of car-financing business deplored . . . Old antitrust case recalled . . . Dealers said to be at mercy of auto producer . . . GM testifies.

◆ THE BIGGEST of them all is still on the Senate griddle. General Motors Corp. is getting it from all sides as Senate investigators press the theme that industrial bigness freezes out smaller competitors.

Testimony of auto parts producers, diesel engine builders, makers of earthmoving machinery, finance companies, and car dealers has been dissected for any evidence of unethical operation by GM.

GM officials are getting a chance to tell how the corporation does business.

Some old charges are being resurrected. New ones are being made.

The GMAC Case

Experience of GM and its subsidiary, General Motors Acceptance Corp., in connection with government antitrust action was reviewed for the subcommitee by Holmes Baldridge, former Justice Dept. official. A civil suit the department brought against GM and GMAC in 1940, alleging suppression of auto finance competition, was ended in 1952 by consent decree.

The government had maintained that it would be desirable to terminate stock ownership of GMAC by the auto firm. However, this action was not ordered by the consent decree. Among finance firms, GMAC handles the largest share of wholesale and retail auto financing.

Thomas W. Rogers, executive vice president of the American Finance Conference, estimated that GM makes and sells about 50 pct of all passenger cars and that GMAC finances about 75 pct of all cars sold by GM dealers. His organization, he said, is made up of 375 independent financing companies. A "substantial number" of these, he testified, find that obstacles are placed in their way when they try to work out financing arrangements with GM dealers.

Commenting on the broad field of car marketing, Rear Adm. Frederick J. Bell testified that the arrangement between the auto producer and the dealer gives most of the breaks to the producer. Speaking as the executive vice president of the National Automobile Dealers Assn., Adm. Bell insisted that the dealer is controlled from the factory in almost every aspect of business.

Dealers Need Independence

He charged that "veiled threats, innuendo, and subtle inferences of reprisal" are used by the auto companies to keep the dealers in line. He also said the manufacturers appear to be uninterested in granting franchises which would afford more independence to dealers and protect them from contract cancellation on short notice.

Charles M. Hewitt, Jr., a consultant to the NADA on franchise matters, stated that "at least 12" states have passed laws to safeguard dealers from arbitrary treatment by manufacturers. To avoid being regulated by these laws, he said, GM put its franchises on a one-year term. Ford and Chrysler, he testified, use franchises of indefinite length which may be canceled on 90 days' notice.

A scheduled parade of former GM dealers before the subcommittee was led by J. E. Travis, Jr., former retailer of Buicks, Pontiacs, and GMC trucks in St. Charles, Mo. He told the group that the firm refused to renew his franchise on Oct. 31 on the grounds that his sales were unsatisfactory. His sales record in 1953 earned him an award from Buick, he said.

Harlow H. Curtice, GM president, vehemently denied that dealers are as bad off as their spokesmen claim. He testified that many dealers are as happy as others claim to be unhappy. And he offered documentary proof that GM franchise holders are not being kicked around. The hearing is in its fourth week.

"Famine" Amid Plenty

At the Washington hearings, several car dealers complained bitterly at the growing factory practice of selling cars "at cost" to employees. "Almost nobody" in the Detroit area pays the retail price for a new automobile, they complain. Nearly all factories today will sell "at cost" to their employees, and they don't check too carefully to find out if the ultimate consumer actually rates as an "employee." As a result, dealers in the Detroit-Flint-Pontiac area are "starving" in the midst of record sales levels.

RESEARCH

Tunnel Cracks Sound Barrier

Jet testing wind tunnel develops speeds up to four times speed of sound . . . Duplicates altitudes of better than 15 miles . . . Temperatures from —120 to 650F.

◆ AIR FORCE'S new wind tunnel at Tullahoma, Tenn., can simulate flight conditions as severe as man can expect to encounter, at least in the next decade, for turbojet, ramjet and turboprop engines.

A 216,000 hp motor drive system operating a battery of compressors will drive air at speeds up to four times the speed of sound—about 3000 mph. Flexible equipment will direct the "hurricane" through or around the engine to be tested.

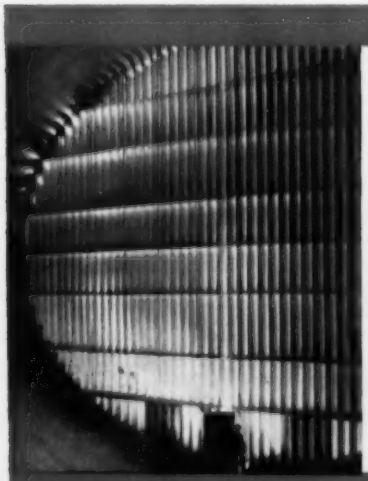
Same unit powers exhauster which will duplicate atmospheric pressures approximating those at 80,000 ft altitude.

A coupled heater-refrigeration unit permits a controlled temperature range from 120 degrees below zero to 650 degrees F.

Literally thousands of precision gages and instruments including three electronic brains capable of multiplying 3000 seven-digit numbers in less than one second, are available to collect and evaluate all possible performance reaction.



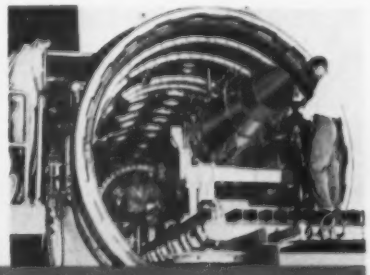
SHOCK wave pattern passing around a 10 degree wedge placed in the new supersonic wind tunnel indicates air speed of almost 4000 mph.



Below: 720 FT steel tank feeds air compressed up to 4000 psi to 72 ft steel vacuum sphere which governs speed of wind as it enters tunnel.

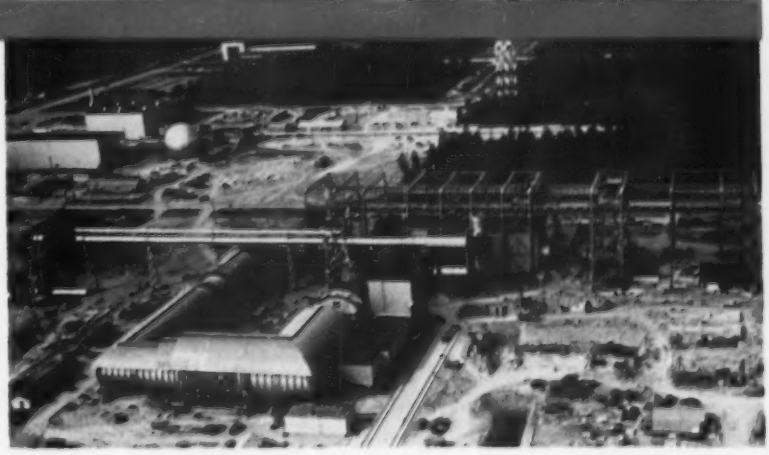


Below: TURBOJET engine to be tested in the wind tunnel is mounted on transfer cart in separate shop to guard individual proprietory rights.



Above: TURNING vanes direct the rushing air around corner of the tunnel into test section where mounted turbojet and ramjet engines will react as if in flight.

Right: ALTHOUGH not yet fully completed, facilities of the U. S. Air Force's Arnold Engineering Development Center are among the most modern in the world for testing the jet aircraft of the future.



ARMAMENTS: Egypt Buys New Guns

Acts as purchasing agent for all Arab countries . . . Latest shipment will cost $210 million . . . Czech factories unscathed through World War II supply arms and expert instructors.

◆ EGYPT WILL press her border dispute against Israel with modern, up-to-date armaments.

Egyptian General Hassan Ragab, deputy secretary of defense, has dispelled the impression that his country is arming with surplus World War II equipment.

Says Ragab: "Surplus armament is good for countries which of necessity must get them for next to nothing. But we want the best and most modern. We pay for it and we get it."

Arabs Back Egypt

The income Egypt derives from her major export, cotton, is not adequate to finance a modern arms program. This year's cotton crop is worth about $190 million while her latest arms contract with Czechoslovakia will cost about $210 million. But Egypt is the purchasing agent and arsenal for the entire Arab League. Her cotton proceeds will pay for only a minor part of the arms.

Arms Secret

Ibn Saud II, King of Arabia, makes a substantial contribution for arms from the annual royalties received for his country's oil. This year his oil income will be about $280 million. The Aga Khan, the Sheik of Kuweit and just about all of the Arab leaders look to Egypt for their guns, and they pay cash.

Saudi Arabia and Egypt have signed a mutual defense military pact which specifically states that Saudi Arabia will pay in gold and dollars for arms from Egypt.

The Egyptian military modernization was a well kept secret for strategic reasons. The Israel army has been better equipped, better trained and better organized. However, Egypt and the Arab League outnumber the Israelis about 30 to 1. Now time is on the side of the Egyptians.

Czech Armaments

Egypt is dealing with Czechoslovakia for a number of reasons. The secret of the Czech position in the world arms market lies in years of continuous operation and development. In 1935 Czechoslovakia began to build her armament plants in the valleys of the Carpathian Mountains. In 1938 Hitler moved in and took over all of the major works.

The Germans enlarged the existing plants and built new ones deep in the Carpathians.

During World War II few if any bombs fell on these installations. In 1942 a major new arms research project was launched under the Germans so that when the Russians and their new government moved in they found a going industry with adequate skilled labor.

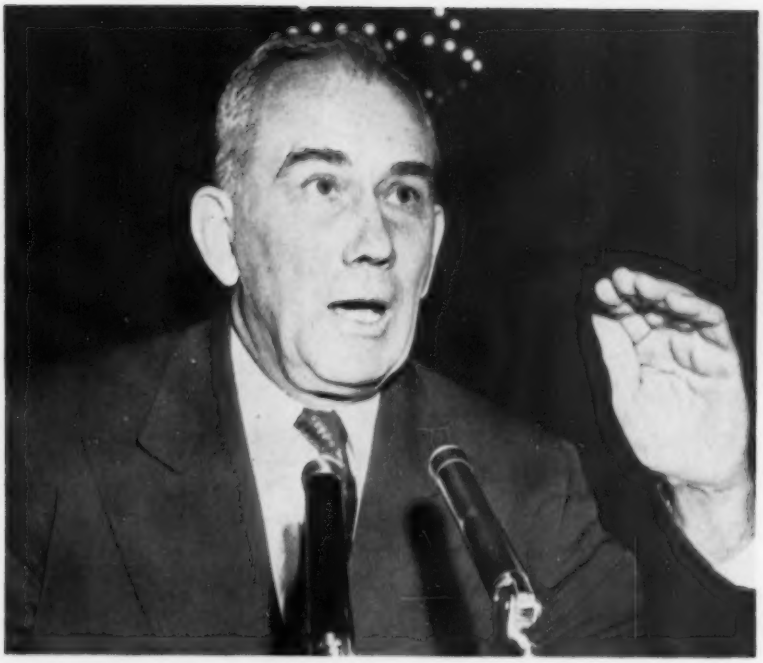
Instructors

The German arms expert who had been in charge of the entire production, expansion, and research carried on during the war was Dr. Wilhelm Voss.

Today Dr. Voss is in the employ of the Egyptian government, teaching the Egyptian army how to use the modern Czech guns, most of which he had a hand in developing. He is assisted by a number of Czech munitions experts: Prantel, an artillery expert; Nohinec, a rockets expert; and Kostrum, a small arms expert.



REVIEW of the Egyptian army indicates that more and more units are being equipped with the newest and most modern in small arms. Efficiency in handling these weapons is also improving under tutelage of experts.



GUILT by association prior to induction is subject of Ass't Army Sec. Hugh Milton's testimony to Senate Subcommittee on Constitutional rights.

Profits:

Five percent ceiling policy up for revision.

Last July the Navy issued a directive limiting interim payments on incentive and price revision contracts. Industry was told to figure on a 5 pct maximum profit in estimating the payments to be made prior to contract completion.

Industry reacted violently. Planemakers in particular said the 5 pct ceiling would often result in underpayment. They said they would be paying out money in taxes when they were actually operating at a loss.

Flexible Profits

As a result of this feeling, few incentive or price revision contracts have been signed since the new policy went into effect. The situation sent Defense Dept. officials into a huddle with industry spokesmen. A new policy is now in final stages of preparation.

Under the new edict, the 5 pct ceiling will give way to flexible profit percentage, which would be negotiated by the contractor and the government. Payments would be made as units are delivered on the basis of quarterly cost reports.

It is expected that contractors will go along with this arrangement.

The whole controversy centers on the provisional payments made as production progresses.

The incentive type contracts allow firms that go under the target cost to keep a share of the saving. Price revision contracts call for the government to review costs after 40 pct of a job has been completed and set new payment figures.

Heavy Press:

Air Force winds up forging phase of program.

About two weeks ago the Air Force put a 50,000 ton forging press into operation at Wyman-Gordon, North Grafton, Mass.

This was the second 50,000 ton press of the program and brought the heavy forging press project to a close.

The Air Force now has four of the big units in operation at two plants. All are making aircraft parts.

The Air Material Command says the presses provided by the program have greatly increased the industrial potential of the United States. Both forging and extrusion presses have been provided.

Well Spread

The extrusion press program is expected to be completed in 1956. Six extrusion presses are scheduled. Of these, four are now in operation and the balance are being readied.

Two 8000 ton extrusion units are now in operation at Kaiser, Halethorpe, Maryland. There is a 12,000 ton unit at Curtiss-Wright, Buffalo, and a 14,000 ton unit at Alcoa, Lafayette, Ind.

One 8000 and another 12,000 ton press are being set up at Harvey Aluminum, Los Angeles.

Two of the extrusion presses were completely built in Germany. Some parts for others came from Japan, Italy, Scotland, England and France.

Urge Tungsten Push

Tungsten rates more research and new Defense Dept. regulations.

W. Lunsford Long makes these statements in announcing a research program to be undertaken by Stanford Research Institute for The Tungsten Institute.

President of the Institute, Mr. Long points to the work being done by commercial airlines and automobile manufacturers in putting jet power to work. He says tungsten research must keep pace with developments in related fields.

Mr. Long says new thinking in the field has been retarded by Air Force regulations dating back to the Korean War. Use of tungsten was restricted at that time because of a supply shortage.

Regulations are still in effect and Mr. Long contends there is plenty of tungsten for domestic use. He says this has been demonstrated and calls for lifting of the curbs.

EXPANSION IN INDUSTRY

Second Largest?

Kaiser Aluminum to up capacity by 50 pct

Kaiser Aluminum & Chemical Corp. is set to embark on an expansion program which will cost $280 million. According to vice-president and general manager D. A. Rhoades, it will make Kaiser the nation's second largest aluminum producer "by a substantial margin."

The project is expected to bring Kaiser's annual primary aluminum capacity up to 654,000 tons, an increase of about 50 pct.

Largest expenditure will be for a new 220,000 ton aluminum reduction plant at Ravenswood, W. Va. Construction on the $120 million facility will begin in April 1956 with completion scheduled by July 1957. Coal will be used to supply power.

Included in the program are construction of a $60 million, 500,000 ton alumina plant on the Mississippi River near Gramercy, La.; and expenditure of $100 million for additional chemical facilities, two new extrusion plants, enlargement of the rod, bar, wire and electrical conductor plant at Newark, Ohio, expansion of forging capacity, and increased rolling capacity.

Behind the Kaiser move is a market analysis indicating an increase in the nation's aluminum usage from the present 4 billion lb per year to over 8 billion by 1965.

Pipeline:

Canada okays construction of natural gas link.

Canada says it approves construction of a multi-million dollar natural gas pipeline from Alberta to Montreal.

Line is part of a vast U. S.-Canadian pipeline pattern that will permit imports of Canadian natural gas to the Midwest and exports of U. S. gas to Ontario.

The complicated plan calls for the Canadian government to form a "grown company" to build and own a 675-mile section of the pipeline from Manitoba.

This section will be leased to the Trans-Canada Pipe Lines, Ltd. Tennessee Gas Co. recently acquired major interest in the Canadian firm.

Another section, estimated to cost $117.6 million, will be financed jointly by the Canadian and Ontario governments. Trans-Canada, which has already spent $13 million in the project, will finance the remaining sections.

Gas export-import plan has touched off a warm fight in this country. The U. S. Federal Power Commission must approve the plan, and competing U. S. gas producers are bitterly opposed.



DISPATCHING board in office high above Manhattan gives Shell Oil Co. to the second picture of all pipelines; terminals operating, speed, amount, destination of oil considering even temperature and pressure changes.

Expansion Briefs

Pittsburgh Metallurgical Co., Pittsburgh; expansion of Calvert City, Ky. plant; increase capacity 25 pct.

Central Foundry Co., Holt, Ala.; add pipe casting machinery, mechanize mfg. and materials handling; $2 million cost.

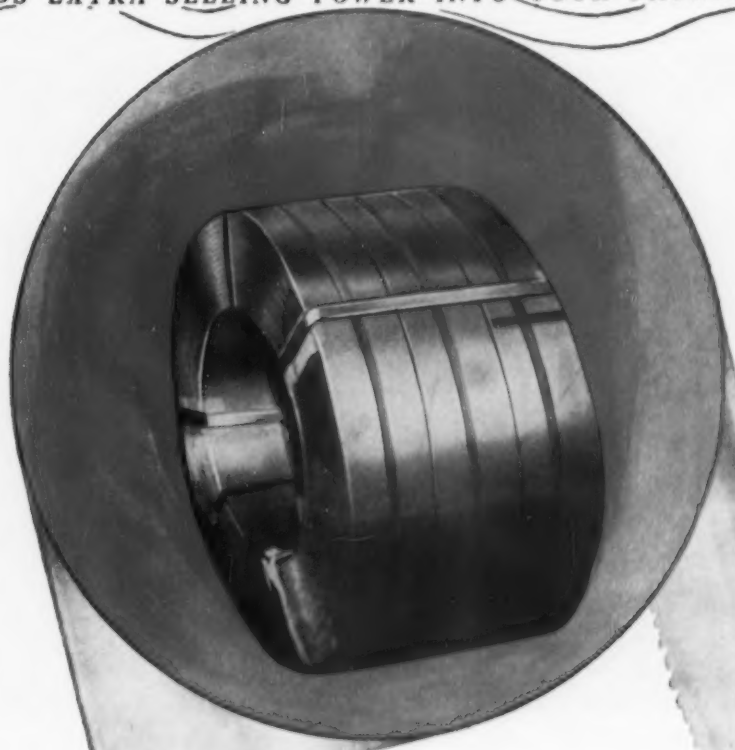
Reynolds Metals Co., Richmond, Va.; new aluminum extrusion plant; Chesterfield County, Va.; $5.5 million cost; production late 1956.

Allison Div., General Motors, Indianapolis, Ind.; new aircraft engine research building.

American Chain & Cable Co., Bridgeport, Conn., $500,000, addition to Adrian, Mich., plant.

Kaiser Aluminum & Chemical Corp., Oakland, Calif.; ordered electrical apparatus for sheet and foil rolling mill from Westinghouse Electric Corp.; Ravenswood, W. Va.; $5 million cost.

BUILDS EXTRA SELLING POWER INTO YOUR PRODUCTS



Custom production and precise metallurgical control - - -

make the difference in

STRIP STEEL

—and . . . we might add . . . a difference in your product sales.

ALAN WOOD STEEL's long-established practice of "custom-producing" precisely to your specifications under the highest standards known . . . assures you of strip steel that contributes a dependable, durable quality to your products . . . and which helps build reputation and repeat sales.

If you require strip or sheet steel —hot or cold rolled—choose an integrated steel specialist with modern, up-to-date, continuous mills . . . one who understands your production problems and delivers according to your specifications.

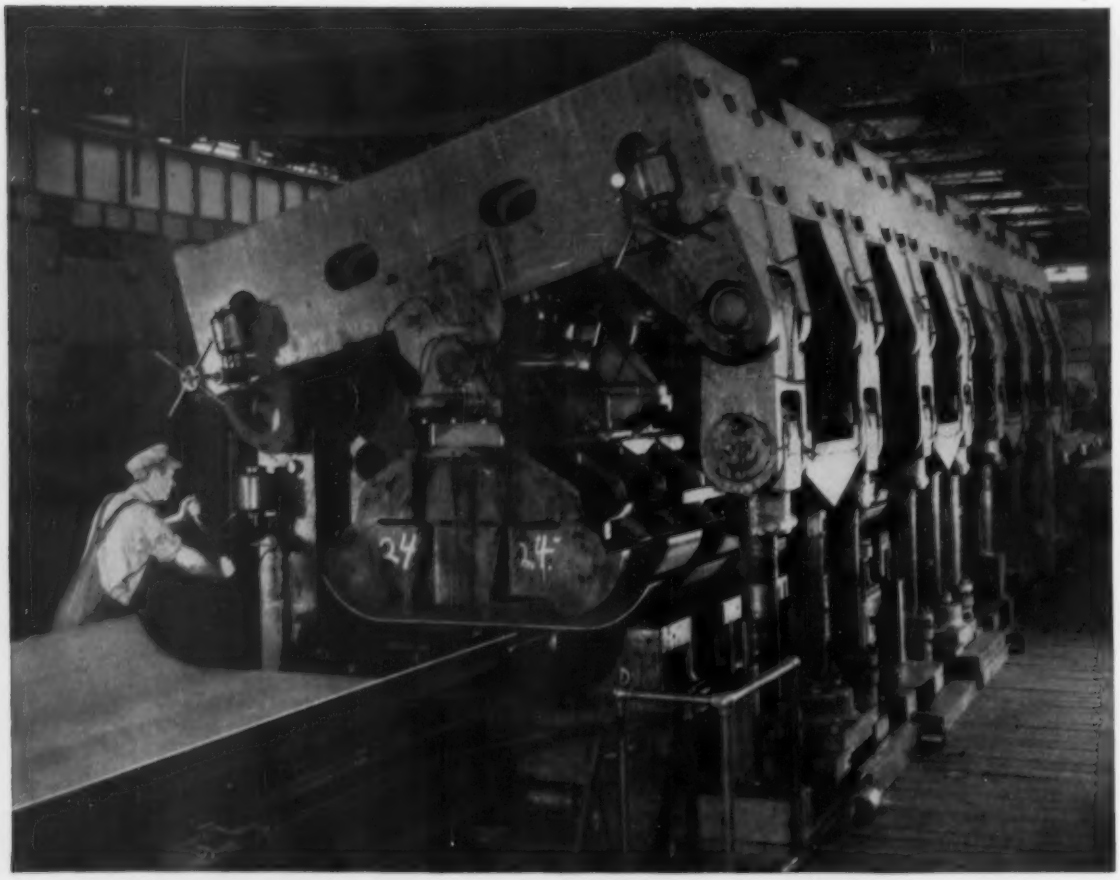
IRON PRODUCTS
"Swede" *pig iron*
STEEL PRODUCTS
Plates (sheared)
Hot rolled sheets
Hot rolled strip
Cold rolled sheets
Cold rolled strip
ROLLED STEEL FLOOR PLATE
A.W. ALGRIP *abrasive*
A.W. SUPER-DIAMOND *pattern*
A.W. CUT NAILS
MINE PRODUCTS
COKE
COAL CHEMICALS

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SM-13



30,000 lbs. of Nickel Iron in eight "U-ing" dies start the bending of carbon steel sheet into tubular shape for large diameter line pipe. Closing dies require about 50,000 lbs. The Milwaukee plant of A. O. Smith Corp. has produced 400 miles of pipe per month. A plant in Houston, Texas, owned jointly with Armco Steel, can push out 200 miles per month. Both plants make sizes from 8⅝" to 34". Sets of dies contain 8 to 32 nickel iron castings supplied by Lindgren Foundry Co., Batavia, Ill.

Nickel cast iron shapes oil line pipe ...outlasts unalloyed iron dies 5 to 1

400,000 CARBON STEEL SHEETS shaped by a single set of dies in use more than two years...

That's how nickel cast iron helps to save money in the production of oil and gas line pipe at A. O. Smith Corporation, Milwaukee, Wisc.

The sheets get their initial lengthwise bend . . . also their press into final cylindrical form...from heat treated 1.50% nickel-chromium-molybdenum cast iron dies.

Wear resistance of these dies contributes two basic advantages: *dimensional accuracy, plus uniformity of finished pipe.*

These advantages cannot be overemphasized . . . even slight variations in size would cause rejections, because line pipe is welded in 40-foot sections at the plant and later the lengths are joined together in the field.

Unalloyed gray iron dies, previously used for shaping pipe, wore rapidly and thus increased rejections.

In contrast . . . the nickel cast iron dies not only reduce rejects, but also give more than five times the service life of the unalloyed type.

Whatever your industry, when you face questions about metal, let us give you the benefit of our wide practical experience. Write for List A of available publications. It includes a simple form that makes it easy for you to outline your problem.

INCO **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N. Y.

Report to Management

Just What Is An Economic Brake?

There is more confusion than anything over the tightening of housing and other credit terms. You can't get a clear decision from the experts on whether they are actually curbing an inflationary danger or just ruining the housing market.

Debate on credit policies shows no unanimity of feeling. You can get some assurance over the government's concern over the danger of inflation. But this isn't much solace if your business is dependent in any way on home construction.

There is general agreement that tighter mortgage terms have affected the housing market seriously. The degree is debatable, but the drop in housing starts appears to be conclusive.

Behind the Smokescreen

There is little danger of the construction industry falling off to any serious extent. In total building, the rise in business and industrial building more than compensates for the drop in new home construction.

But this is not enough to answer all the complaints. And the government is very sensitive to the home building picture. You can count on the Administration's policies on home building being aimed at a minimum of 1,200,000 new homes next year, probably more.

Longer mortgages and easier down payments for FHA and VA home financing will be restored if there is any danger of the construction rate falling below that goal. This could come sooner than generally expected.

There Is a Price Problem

Tighter money terms are not aimed entirely at the home building picture—even though the most obvious effect of the money policies was to cut into home buying. The problem is deeper than that.

One of the most encouraging factors of the 1955 economic upsurge is that it has not been accompanied by sharply rising prices. Recently, however, prices have been turning upward from the level line.

Current shortages of materials are contributing to the danger of inflation. And the demand for credit in all segments of the economy tends to exceed available funds. These are the problems the Administration's money policies are aimed at. To date, there has been little evidence of real inflation. But it remains a serious problem.

Watch Your New Plant Location

Don't cram new factories into areas already crowded with productive plants if you want to get more military business.

Newest Pentagon statement of policy on industrial dispersal does show moderation. It indicates realization that it is impossible to move existing facilities entirely away from target bomb areas.

But armed forces are to gage their orders to make fullest use of geographical distribution of producers. Where more than one source offers a desired product, plant dispersal will be a major factor in influencing choice.

Watch Auto Sales

Key to most material supply situations is in Detroit. If auto production should ever lag, the entire picture can change over night. It's too early to tell what to expect from 1956 models, so keep your eyes open.

There is a lot of confidence in Detroit. Automakers are probably the world's best merchandisers and, given half a market, can make the best of it.

INDUSTRIAL BRIEFS

Furnaces . . . Three of the largest slab heating furnaces in the world were recently placed in operation at the Weirton Steel Co., division of the National Steel Corp., Weirton, W. Va. Each furnace has a normal capacity to reheat 200 tons of steel slabs to rolling temperature per hour.

Canadian Export . . . The Canadian Institute of International Affairs has engaged Battelle Institute, Columbus, Ohio, to conduct a survey aimed at determining the source and value of exports to Canada.

Economic Research . . . Distribution of goods has employed an increasing share of the nation's labor force since 1930, says Dr. Harold Barger, Columbia University, in a study for the National Bureau of Economic Research. Dr. Barger also indicates that over the same period the share of the labor force employed in production has declined.

First Patent . . . Bristol Laboratories Inc. has been issued the first U. S. patent on an orally administered penicillin product in a stable, ready-made aqueous form.

Steel Structurals . . . Based on an expected backlog of orders on fabricaters' books of 1.8 million tons as of the end of 1955, E. V. Grover, president of the American Institute of Steel Construction, indicated that 1956 shipments of fabricated structural steel would definitely increase.

Forging Ahead . . . Industrial heating equipment industry sales for the first ten months of 1955 are breaking all peacetime records and are even ahead of the Korean War period, according to the Industrial Heating Equipment Assn.

Musical Oil Drums . . . Used steel oil drums are the sole musical instruments used by entire bands in Trinidad and other West Indian islands, according to an American Iron and Steel Institute report. The instruments are tuned and toned painstakingly by hand.

Tidal Waves . . . Three geologists, Dr. Maurice Ewing, Dr. Frank Press, and Dr. William L. Donn of Columbia University, have developed a method which can warn coastal industries in advance of potentially dangerous tidal waves, according to a report from the Engineering Foundation. Procedure gages degree of atmospheric disturbance combined with the natural wave period.

Coke Ovens . . . Republic Steel Corp. recently put into operation a new battery of 31 by-product coke ovens, with a total annual capacity of 183,000 tons.

Safety Feature . . . A new detector has been perfected for use in metalworking plants utilizing a photo-transistor to indicate the presence of hot metal.

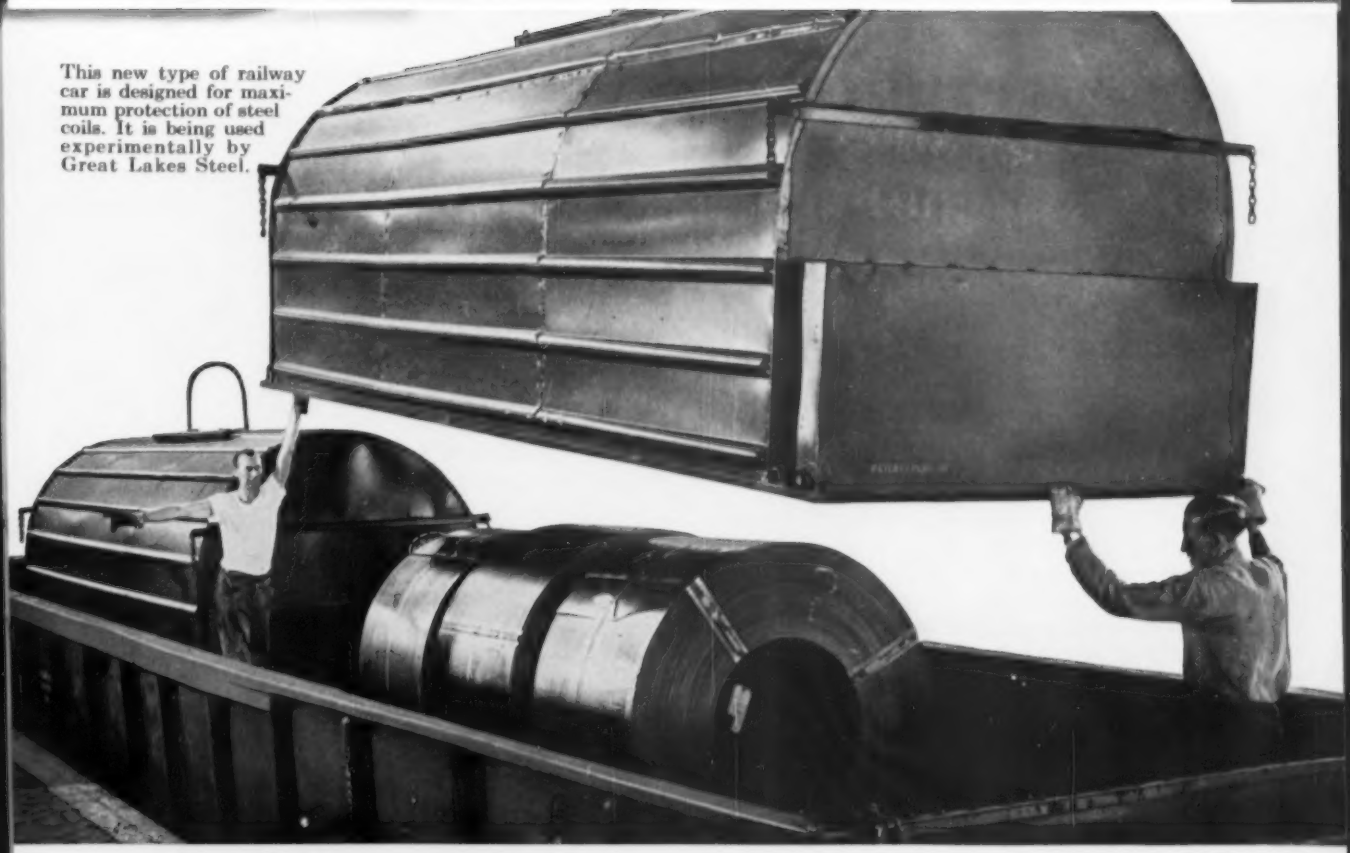
Positive Approach . . . A new positive-factor job rating plan has been developed by Management Service Specialists, division of Barone Associates, Upper Darby, Pa. The plan providing a simplified and more accurate approach to job classification in industry is being installed in a number of plants in the Philadelphia area.

Sales Representative . . . The Taft-Pierce Manufacturing Co. has appointed Acme Tool & Supply Co. as sales representative in the San Diego area. Acme will handle the Taft-Pierce standard product line of fixed gages, air gages, small tools, and magnetic chucks.

Appointed . . . Arcos Corp., Philadelphia, has appointed J. W. Fraser & Co., Charlotte, N. C.; United States Welding Works Co., Denver, Colo.; Georgia Supply Co., Jacksonville, Fla., and Ferguson Welding Supply Co., Benton Harbor, Mich., to handle the company's full line of electrodes and welding rods.

Change of Name . . . Stockholders of the Houdaille-Hershey Corp. have approved change of the company's name to Houdaille Industries, Inc., which they feel will be more descriptive of the corporation's widened scope of operations.





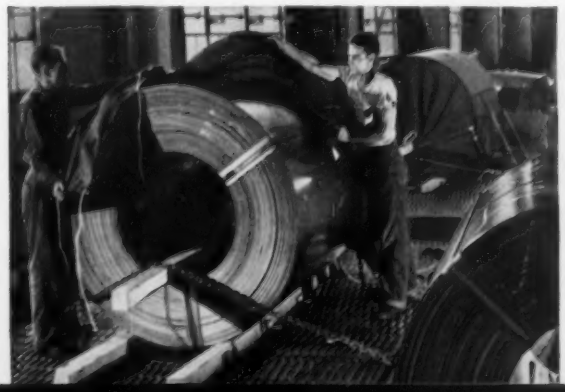
This new type of railway car is designed for maximum protection of steel coils. It is being used experimentally by Great Lakes Steel.

How Great Lakes Steel *delivers* quality



Another order receives individual attention as sheets of steel are wrapped with a waterproof covering and banded to meet the customer's specifications.

Steel coils (below) are securely blocked on a truck and trailer at Great Lakes Steel. Heavy tarpaulin cover is provided by truckers as standard equipment for additional protection.



The emphasis on quality at every stage of production at Great Lakes Steel extends right on through to the Delivery Department. There, careful attention is given to handling and packaging each coil and bundle to make sure that the customer receives his order in prime condition.

The Delivery Department has another important responsibility, too. It must see that our products reach each customer in ample time to meet his production schedules.

For quality with service—that extends all the way from the beginning of our operations to the end of yours—call on Great Lakes for your flat-rolled steel requirements.

GREAT LAKES STEEL CORPORATION

Ecorse, Detroit 29, Michigan • A Unit of

NATIONAL STEEL CORPORATION

District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.

AUTOMOTIVE ASSEMBLY LINE

An Alert Auto Supplier Can Survive

Mitchell-Bentley moves ahead in a tough field . . . Versatility and initiative draw business from independents and Big Three . . . Station wagons, Continental body assembly are big orders—*By T. L. Carry.*

IN THESE DAYS of hard pressed automotive suppliers, many of them caught in the squeeze as automakers make more of their own parts, there are still exceptions thriving on today's conditions.

The Mitchell-Bentley Corp., with plants at Ionia and Owosso, Mich., is one of the most versatile industries in the country and owes its existence mainly to the automobile industry.

The company makes station wagon bodies for Buick and Mercury and also does some interior trim work for Packard and Studebaker. In addition, the firm also assembles bodies for the Continental. Among its other activities are the manufacture of tubular steel adding machine stands, the production of trunk linings for Buick and Oldsmobile and a small amount of defense production.

Company History . . . How these various operations are performed is a story in itself but equally interesting is the evolution of the Mitchell-Bentley Corp.

The firm actually started out as the Ypsilanti Reed Furniture Co. in 1901. The company flourished through the early part of the century and concentrated its operations at the firm's main plant in Ionia.

Its position in the furniture industry deteriorated during the depression and in 1938 Don R. Mitchell, at the time a consulting engineer, was called in to see if he could salvage the business.

Mr. Mitchell's experience was entirely automotive. This experience, combined with the company's tubular steel furniture line, resulted in contracts for making truck and bus seats.

Made Own Market . . . After World War II, Mr. Mitchell convinced the auto industry that his company's experience in woodworking qualified it to make wood station wagon bodies. He also pointed out how his firm could save the major manufacturers tooling costs and also free plant space for other activities.

In 1953, the company merged with the Owosso Manufacturing Co. Thus, the Mitchell-Bentley Corp. was formed.

Also in 1953, the company revamped its production lines for the advent of the all steel station wagon body and is now making the units for Mercury and Buick.

How It's Done . . . Stampings for the Mercury bodies are sent to the Ionia plant where they are assembled, painted, and all the interior trim including the seats is installed.

Bodies for the Buick Estate wagon are produced in an unorthodox fashion. Mitchell-Bentley receives regular 4-door sedan bodies from Buick and reworks them into station wagon units.

This is accomplished by cutting off the top half of the body, placing it on a jig and attaching an extended roof and upper rear quarter panel. The rear door must also be reworked to conform with the body's new contours.



BUICK 4-door sedan body becomes slick station wagon at Mitchell-Bentley Corp. plant. Versatile company thrives in auto supplier role despite supplier squeeze. It serves competing divisions, independents and Big Three, has confidence in future operations.



RB&W FASTENERS - *Strong Point of any assembly*



Putting the squeeze on wire for a better bolt or nut

HERE's wire rod squeezing through a succession of drawing dies at RB&W. Why draw wire when it can be purchased in standard dimensions? Because it's a form of quality control that helps make better fasteners.

RB&W has a whole battery of machines to handle round and rectangular stock, even up through 1-inch size. Above you see Dominick DeCarlo keeping a keen eye on rod destined to become cold upset bolts. He's typical of many RB&W people . . . been with the company over 15 years.

He's doing a job that more accurately sizes the material . . . strengthens it . . . assures its uniformity . . . permits control of the coating used and, therefore, of the finish obtained.

It's this combination of facilities, experience and quality control in action in every RB&W plant that assures you more fastener quality for your money . . . a reliable source of supply . . . and strong fasteners that never let you down.

Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

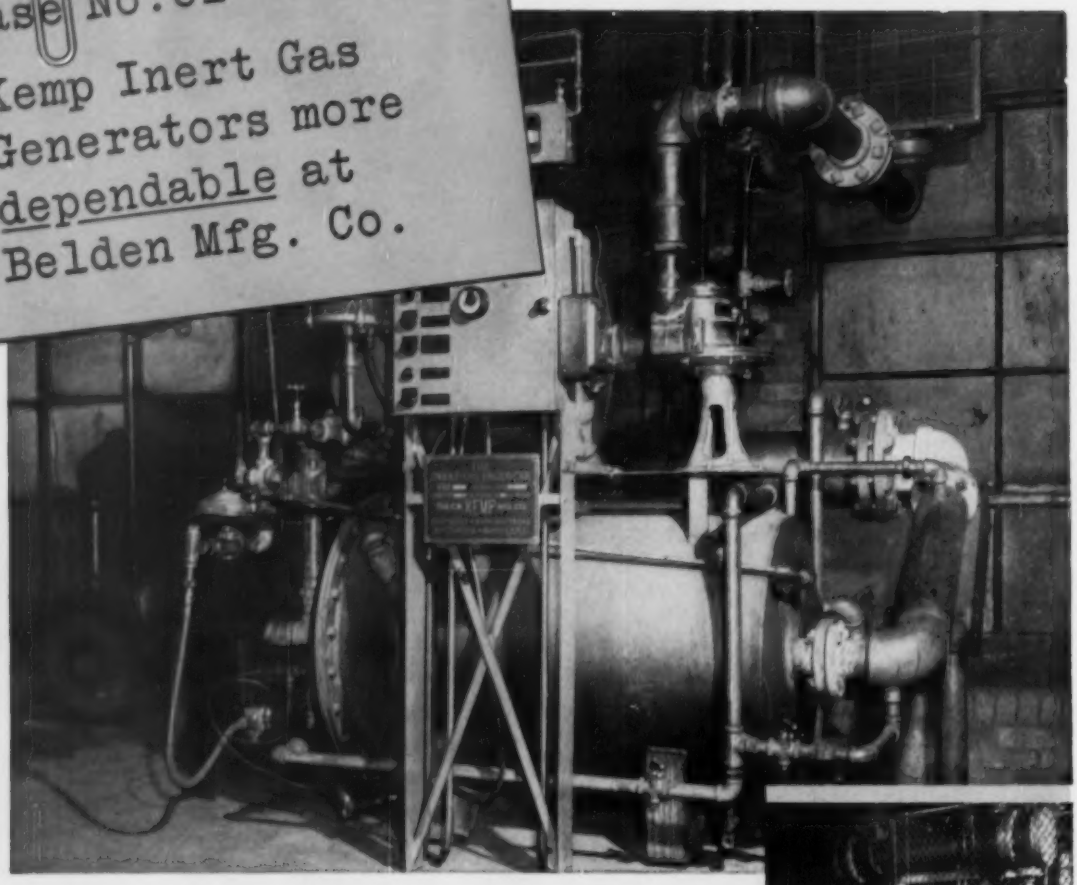
R B & W

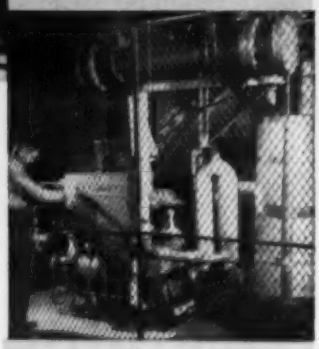
110th year

Plants at: Port Chester, N. Y., Corsopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Seattle. **Distributors** from coast to coast.

Case No. 61

Kemp Inert Gas Generators more dependable at Belden Mfg. Co.





Generator on first floor of plant is enclosed in wire cage to prevent tampering with controls.

How Belden utilizes two Kemp Generators in annealing copper wire

Annealing copper wire necessitates cooling in an oxygen-free atmosphere to prevent harmful oxidation. For the required protective atmosphere in this process, the Belden Mfg. Co., Chicago, Ill., generates its own inert gas. But the generating equipment formerly used by Belden did not operate reliably . . . results were erratic. So Belden installed two Model MIHE Kemp Inert Gas Generators to handle this important job.

And Kemp *Handles* the Job

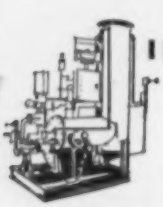
These two Kemp units assure Belden of a *dependable* inert supply. They deliver a more constant flow at the rated pressure . . . have been operating smoothly and satisfactorily since installation. Kemp's ability to produce a chemically clean inert at a *specific analysis regardless of demand* eliminates the danger of fluctuation at a critical stage.

Kemp Units Engineered for Service

Like Belden, you specify reliability when you specify Kemp. Every Kemp design includes the Kemp Industrial Carburetor for complete combustion without tinkering, without waste . . . for simplified installation and maintenance. Every Kemp design includes the very latest fire checks and safety devices. Annealing, hardening, sintering—whatever your problem, find out today how Kemp engineers can help you.

For more complete facts and technical information, write for Bulletin I-10 to: THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

KEMP OF BALTIMORE



INERT GAS GENERATORS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • ADSORPTIVE DRYERS
SINGEING EQUIPMENT

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Dec. 3, 1955	188,830*	28,871*
Nov. 26, 1955	158,126	22,963
Dec. 4, 1954	148,790	22,387
Nov. 27, 1954	120,713	19,145

*Estimated Source: *Ward's Reports*

The complexity of the job is realized when you consider the hundreds of different colors and wiring combinations which have to be installed. In addition, the right body has to meet the right chassis at Buick and Mercury plants across the country at the precise time the station wagon is scheduled for assembly.

Good Future . . . Mitchell-Bentley's work force has increased by leaps and bounds since the end of the war and the workers, oddly enough, do not belong to the UAW but are members of the CIO Furniture Workers Union.

Mr. Mitchell foresees the time when the station wagon will become so popular that auto producers will personally assume production of their own bodies. But he is not worried about the future of his firm.

He firmly believes that the most vital part of his business is its flexibility. In addition, he has built the company's reputation on the principle that it can do a job which is not economically feasible for an auto company to do itself.

He adds that there will always be some kind of a job along those lines and his company is versatile enough to fill an automaker's needs when the time comes.

Here Comes Motorama

The auto industry's greatest merchandising show, General Motors Motorama, will tour the country again next year with what GM claims will be a bigger and better version.

On tap for the Motorama, which opens in New York on Jan. 19, is a completely new line of dream cars plus the presentation of a new concept of highway travel in the automotive future.

The show will also visit Miami, San Francisco, Los Angeles and Boston.

In addition to the corporation's new cars and trucks, home appliances and other products which GM makes will also be on display.

Harlow H. Curtice, GM president, says the show will be more than a product display and predicts that the educational value will be greater than that of any of the other Motoramas.

Electronics:

Mechanical brain checks Chrysler warehouses.

The MoPar Div. of Chrysler Corp. has installed a huge electronic brain at its headquarters in nearby Centerline, Mich. and is presently using the machine to keep track of its inventories at the division's eight warehouses across the country.

The machine keeps track of more than 85,000 different parts and accessories. When using old fashioned bookkeeping methods, it took the division a week to find out what was happening to its inventory but the IBM machine makes it possible to keep daily records. It can make more than a quarter of a million inventory control decisions in a day.

Record or Print

The machine has a thinking section and a memory section. The thinking section gets information from the memory section and then performs whatever adding, subtracting or multiplying which is necessary. The results can be permanently recorded electronically or the machine can print a report. The recording and printing functions can be performed at the same time.

Chrysler began considering the installation of the machine in 1953. An intensive study was made to set up a system for feeding data to the machine and operations began late this year.

The corporation has not purchased the machine from IBM but leases it on a monthly basis. IBM engineers are always on hand at the MoPar Div. to see to it that the unit is operating properly.

THE BULL OF THE WOODS By J. R. Williams

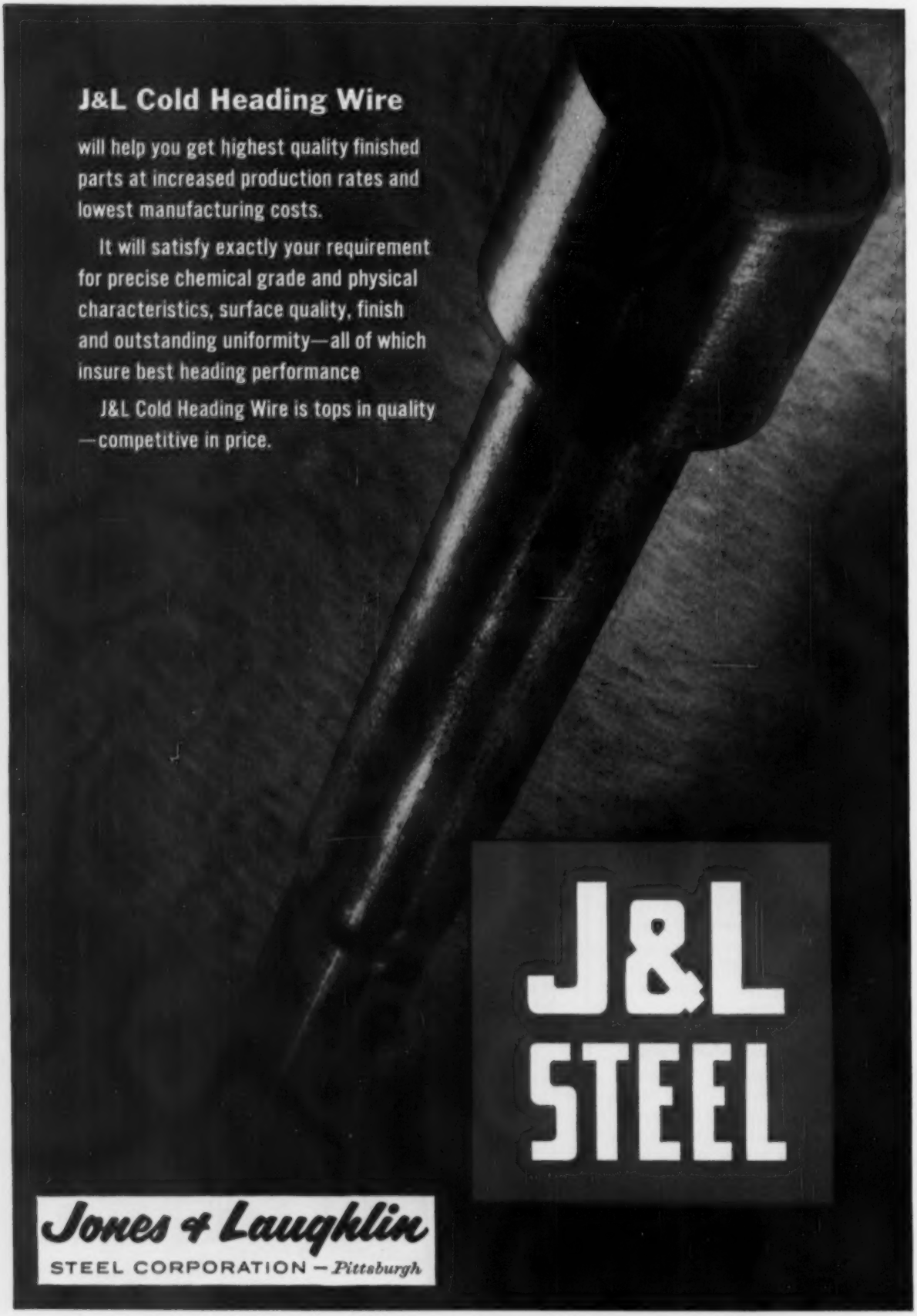


J&L Cold Heading Wire

will help you get highest quality finished parts at increased production rates and lowest manufacturing costs.

It will satisfy exactly your requirement for precise chemical grade and physical characteristics, surface quality, finish and outstanding uniformity—all of which insure best heading performance

J&L Cold Heading Wire is tops in quality —competitive in price.



J&L STEEL

Jones & Laughlin
STEEL CORPORATION — Pittsburgh



Why We Face a Foreign Aid Boost

U. S. sends $2.7 billion to allies now . . . More needed, says the State Dept. . . . Recent Russian coolness dictates hike . . . Wavering friends have their allotments sliced—By G. H. Baker.

◆ FOREIGN aid is going to cost us more money, not less, next year.

This is the story being "leaked" by the State Dept. these days in preparation for a big new budget request which is to be unveiled in January.

We've been handing out foreign aid at the rate of $2.7 billion annually in recent years. The State Dept. now says this sum must be increased because the Russians talked tough at Geneva.

India Draws Frowns . . . Secretary of State Dulles reports that he is taking action against countries that are following the Communist line. He points out that he has reduced U. S. funds for India from $50 million to $40 million. He says he will take the $10 million thus saved and spend it where it will be more appreciated.

Mr. Dulles is sending advance notice to the Senate and House appropriations committees that he will not be satisfied with the $2.7 billion in the next fiscal year. It is suggested by some of his assistants that the new money request will be around $3 billion.

Aid Depressed Areas . . . Sharply stepped-up federal aid to areas where unemployment is a major headache is being urged on Congress by the CIO.

The union says these are immediate "musts" for the nation's 125 existing distress areas:

Government should pay cost of moving workers out of the areas.

Unemployment compensation should be extended and increased.

Surplus food should be distributed without charge.

Extra cash relief should be extended when local relief agencies cannot maintain family health.

Modify pension set-ups so workers need not wait until age 65 to draw benefits.

Central Buying Bogs . . . Procurement officials of the three military services are still tenaciously hanging on to their powers to spend billions of dollars of tax funds independently, despite congressional sharpshooting.

In the eight years since the lawmakers ordered a centralized program for buying housekeeping items, almost nothing has been changed.

Rep. McCormack, D., Mass., House majority leader, recently fired a broadside at the Pentagon, but was apparently unable to penetrate the armor.

Charge Waste . . . He charged that "evidence is conclusive that the overlapping, duplication and waste is of such magnitude in and

Conduct:

Government issues new rules on unpaid businessmen.

Congressional heckling of unpaid businessmen who advise the government should be minimized under a new set of conduct rules issued by the Eisenhower Administration.

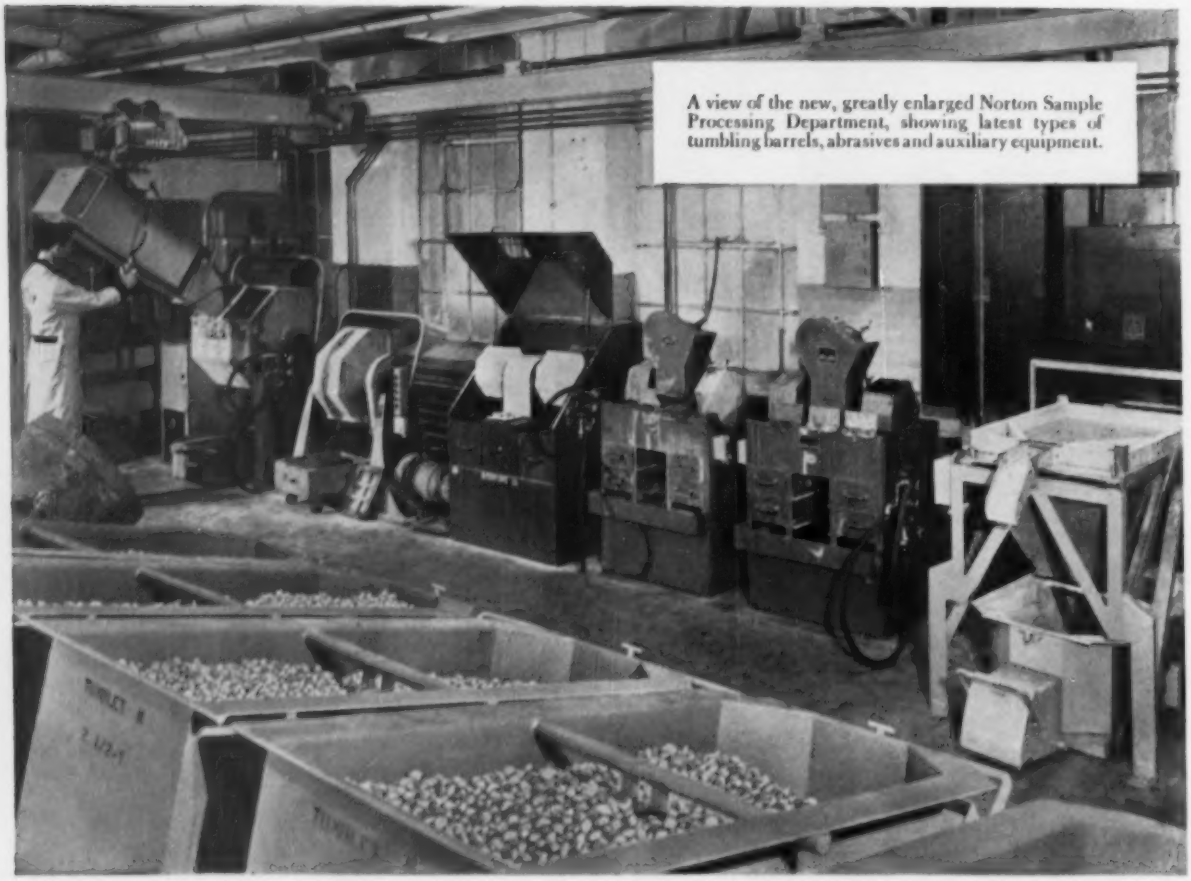
Functions of the expert who accepts a temporary post are limited by the new rules to the giving of advice to full-time federal employees charged with making policy decisions. Specific recommendations from a WOC on a policy matter are prohibited.

No advisory help is to be offered by the expert in instances where his own company is affected. Here, in particular, the executive order seeks to prevent any appearance of a conflict of interest on the part of a WOC.

Within 30 days after an industry executive has been named to an advisory position, his name and title and the name of his business employer must be filed with the Federal Register. The agency with which he will serve is also to be shown.

Each appointee is to file for the Federal Register information about his relationship to any corporations or partnerships in which he holds or has immediately left a key position, plus names of any firms wherein he has or has recently held a financial interest. He must prepare, after each six months of service with the government, a statement describing any changes that have occurred.

Prepared by the Justice Dept., the presidential order is in harmony with an amendment made this year to the Defense Production Act to require publication of data on the financial interests of businessmen in government. Assistant Attorney General Stanley N. Barnes, who had charge of work on the order, is scheduled to be questioned on it by the House subcommittee on monopoly.



A view of the new, greatly enlarged Norton Sample Processing Department, showing latest types of tumbling barrels, abrasives and auxiliary equipment.

Find out what barrel-finishing can do for you

Make the Norton Sample Processing Department your proving ground for faster, lower cost production methods

If you're still finishing metal parts the long, hard, expensive way — with out-of-date tumbling or off-hand methods — here's your chance to find out how you can improve product quality and cut production time and costs.

The newly enlarged Norton Sample Processing Department puts at your disposal the very latest advances in barrel finishing — including equipment, abrasives and techniques.

Perhaps you'd like to speed up your deburring or descaling operations. You may have complicated parts. You may want to get a better color on your finish, or a lighter cut on die castings so as not to cut under the smooth outside surface.

Whatever your finishing problems, just send us sample parts — and they can range from tiny needles to hefty forgings. Without charge or obligation Norton production engineers will find out just what tumbling will do for you. Your finished parts will be returned along with a detailed report telling you exactly how to get best results from tumbling in your plant. This includes recommendations as to barrel type, size, speed and time cycles . . . type, size and amount of abrasive media to use . . . proportion of compound or cleaner to water, and other data.

What To Send Us

Along with your unfinished parts please forward: (a) a finished sample to be matched (hand-finished if necessary); plus (b) information on your present barrel finishing equipment, if any, including type and size of barrel and speeds. Address the Sales Engineering Department, Abrasive Division, NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G-300

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BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

among the military services as to make possible enormous savings, with no loss of efficiency or military effectiveness."

In reply, a top Pentagon spokesman says Congress, while it did recommend supply "unification," did not specify any type of purchasing system — in effect, that the Defense Dept. is running its own business, thank you.

Since 1947, when the unification act was passed, the only major procurement program placed under central management involves food purchases. And this program was turned over to the Army only last month.

Asia:

See raw materials permitting limited steel growth.

Nations in the Western Pacific and Asian areas can expand their steelmaking potential substantially by intraregional trade in the basic necessities, iron ore and coal, a new study of that vast area reveals.

It would be unwise, says the study, for those countries to attempt full-scale manufacture of heavier products in the plate, rail, and sheet groups. The likelihood is that these items and large structural beams will continue to be ordered from traditional sources in the foreseeable future.

Undertaken as a subcommittee project by a United Nations regional commission, the survey appraises the opportunities for limited expansion of iron and steel output in many Far Eastern areas.

Others Have Ore

Mainland China and India are possessors of much of the iron ore and coking coal in Asia, it is admitted, but they have no monopoly on the total supply.

Iron ore deposits in Indonesia and the Philippines have been evaluated at 45 pct to 50 pct iron content. Each of these areas has coal, though coking coal supplies now are judged to be small.

Coal deposits of high quality are found in Viet-Nam, which also has perhaps 100 million tons of good-grade iron ore. Pakistan has iron ore and coal reserves, though no known coking coal. Burma has iron ore and coal deposits, and Thailand has large reserves of good iron ore.

If an exchange of fuels and ores among these and other Asian nations could become routine, the study suggests, greater steelmaking activity would result. It would not be necessary for integrated steel production to be undertaken on large scale in order for the producers to become more self-reliant.

Relatively small amounts of capital are required to set up steelmaking enterprises in the region surveyed, it is held. The outlays may be further reduced, where high-grade coking coal is not to be had, by the use of inferior grades, plus hydroelectric power, charcoal, and natural gas.

Probe Discounts

Congress and the Federal Trade Commission are studying new laws and regulations to more effectively control discounts granted by manufacturers to retailers who buy direct.

A House Small Business committee is looking into charges by small retailers that the laws need clarification to cover manufacturers who charge one price to wholesalers and a slightly higher price to retailers—such as department stores and mail order houses—who buy direct. Both prices would be below the normal price to retailers from wholesalers.

Small business group is concerned that the small merchant who must buy from wholesalers is at a competitive disadvantage over the store which gets the special discount.

Federal Trade Commission is looking into the possibility of taking action against mass retailers.

Takes BDSA Post

Expert industrial production knowledge is brought to the Business and Defense Services Administration by Clifford G. Pommer, new director of the Shipbuilding, Railroad, Ordnance, and Aircraft Div. of the agency.

Mr. Pommer, of Schenectady, N. Y., has had 30 years' service with General Electric Co. His most recent assignment with the company has been as marketing manager for aircraft and ordnance operations in Schenectady.

Distressed Area Aid

Federal government should provide loans of up to $90 million to distressed industrial cities and rural areas to help them build modern plants to attract new industries, Congress is being told.

William L. Batt, Jr., executive secretary of the Toledo Industrial Development Council, says such a program of loans and loan guarantees would save the government money in the long run.

The nation now pays $136 million a year to subsidize unemployment in at least 17 chronic labor surplus areas, he says. It would cost $271 million to build modern, one-story plants in those areas, he argues, and the government should loan up to $90 million, or one-third of the cost, to help those areas out.

Availability of modern, one-story plant space at a low price is the "greatest inducement" to bring new industry into a community, Mr. Batt says. Each $10 million in government loans could stimulate a private investment of $35 million a year for new plants, he adds, if the funds were kept revolving.

Desocialize Mill

The $250 million Paz del Rio steel mill should be owned completely by the public by 1971 at the latest, if plans of the present government of Colombia work out.

Present government of the South American republic has adopted a plan by Dr. Carlos Villaveces, Minister of Finance, to sell some 320 million shares of stock in the mill, second largest steel mill in South America, to the public through the Banco de la Republica.

CLEAN-CUT CASTINGS



Close-up view illustrates easy access to metal well from furnace — tie rods are staggered for better accessibility.

The "all new" H-P-M casts cleaner, faster and more accurately — the simple formula for reduced casting costs.

and "Right On The Button" For Size

Cleaner castings, negligible scrap and better dimensional control with production output to meet job requirements are the records being set at Ajax Die Casting & Manufacturing Co., Tulsa, Oklahoma. They're using the new H-P-M Die Casting Machine — the answer to many of today's die casting problems.

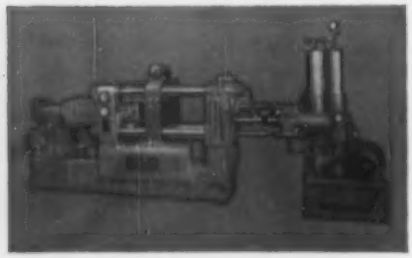
H-P-M's all-new clamp design cuts costs on casting jobs. Accurate closing of mold eliminates excessive flash—saves metal and expensive cleaning work, avoids customer complaints. The new clamp design has plenty of "beef" — limits elongation of frame, compression and deflection of locking members; clamps mold firmly during metal injection.



Mr. M. M. Alexander, co-owner says, "We find the new H-P-M Die Casting Machine to be thoroughly dependable and parts are being consistently produced within tolerances. Casting gates are clean-cut with a minimum of flash."

Write today for Bulletin 5400 and see how an H-P-M can *logically* reduce casting costs for you, too.

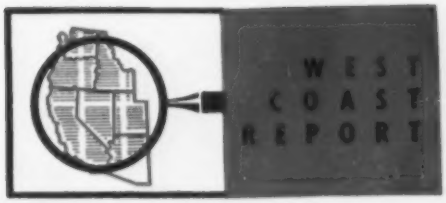




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HPM



Coast Aircraft Industry Left Intact

Latest Defense Dept. ruling puts brakes on any dispersal of existing plants . . . Aircraft, guided missile production will continue in high gear . . . Means big boost for aircraft makers—By *R. R. Kay.*

◆ METALWORKING HERE can now breathe a sigh of relief. The West Coast aircraft industry will be kept intact and humming at high speed.

Air Force Sec. Donald A. Quarles has come forth with the long-looked-for Defense Dept. policy statement on aircraft plant dispersal. See THE IRON AGE, West Coast Report, Nov. 24, 1955, p. 65. He shapes the policy up like this:

(1) There won't be any dispersal of existing plants. Aircraft and guided missile production will continue here.

(2) All new plants will be built away from Pentagon-designated prime targets, not necessarily away from the coasts.

This is good news for aircraft manufacturing—largest manufacturing industry on the West Coast—and for the thousands of metalworking firms from San Diego to Seattle who depend completely, or in large part, on business from the major aircraft plants.

Means Healthier Economy . . . Some expansion-minded westerners will find the Defense Dept. policy a bitter pill to swallow. But it may prove a blessing in disguise. Now that aircraft manufacturing will be stabilized at present high levels it will expand. For commercial work, there'll be less dependence on the military dollar, more on the civilian. In the long run, this should make for a healthier economy.

Periscope Previews . . . Look for UAW-CIO unions to hit the aircraft industry for big raises and some form of supplemental unemployment benefits. Some 250,000 aircraft workers are involved. Union contention: aircraft manufacture is booming and profitable, now's the time. A knock-down-drag-out fight could develop.

Kaiser Aluminum & Chemical Corp. is figuring on even greater expansion of its alumina and aluminum reduction facilities. That's in addition to $90 million expansion recently announced.

Big jump in California-Europe trade may be around the corner. West Germany needs West Coast raw materials. She's studying shipment via Panama Canal.

Chrysler Corp. plans to hike production at its San Leandro (San Francisco Bay Area) plant. California's uranium boom is fizzling out. No important ore strikes are reported yet.

Chevrolet Gains . . . Plants at Oakland and Van Nuys will build 260,000 cars and trucks this year—up 59 pct from 1954. Kaiser Steel Corp., Oakland, is studying plans for major expansion of its facilities. Firm now employs a record 10,000 workers.

California's Governor Knight says the state will need, in the next five years, 53,000 new classrooms costing $2 billion.



NIKE, ground-to-air guided missiles are manufactured on a mechanized overhead conveyor line which carries the units through successive assembly operations at Douglas Aircraft's Santa Monica, Calif., division.



"Scrap and Pig for the Furnaces." Agnes Potter Lowrie depicts a variety of objects which will emerge Phoenix-like from the flames of the open hearth to new life as virgin steel: buck-toothed gears, a section of track, machine shop shavings, old tubing, stampings and, bulking equally large, rusty red pig.

The Fine Art of Steel Making

In sharp contrast to many industries, the basic ingredients of steel making have changed little, if any, over the years. How then has steel been able to spearhead America's industrial growth? How has it been able to produce more steel, better quality steel year by year?

Because steel men have worked constantly to improve the *mechanics* of steel making, as well as the metallurgy. And because steel's suppliers have paralleled every such improvement with an equal advance of their own.

Consider the materials which smooth the process of steel making — Ironsides Gear Shield lubricants. Heavy Gear Shield, once hand-paddled onto exposed gears, is now formulated with a solvent for quick spray application.

For encased gears, Gear Shield was produced in liquid form for pouring, pumping or timed-jet application. Later Ironsides was among the leaders in developing extreme pressure lubricants.

Today, so widespread is the acceptance of Ironsides lubricants that other makers have attempted to refer to their own products as "gear shield", even though Gear Shield is an Ironsides trade mark.

Ironsides is not mass production. We are the "Custom Tailors" of lubrication. Our special position is due in large part to our flexibility. We can — and do — formulate for individual applications and supply these formulas in any quantity from pails to tank cars.

We like tough problems; we've solved a lot of them. For example, Palmoshield, replacement for palm oil and most important advance in lubrication since World War II. If you have a problem, we'd like to help lick it. A letter will summon one of our research engineers. The Ironsides Co., Columbus 16, Ohio.

SHIELD PRODUCTS

Ironsides

By the makers of Palmoshield • "the palm tree that grows in Ohio"

MACHINE TOOL HIGH SPOTS

If Automatic Machines Never Missed—

Close tolerances still an automation problem . . . Variance leaves need for selective assembly . . . Builder says uniform precision would cut costs, improve product quality—By *E. J. Egan, Jr.*

◆ IT HAS often been said that modern, automatic machine tools are designed to produce better products, in less time, for fewer dollars.

Jacob J. Jaeger, president of Pratt & Whitney Co., Inc., takes this thought a specific step further. He thinks that the automatic or automation approach to machine tool design has the qualities that will ultimately produce better assemblies of machined products.

Addressing a group of quality control engineers, Mr. Jaeger spoke particularly about manufacturing areas that involve selective assembly.

A Real Gain . . . "It would be no modest gain if parts could be produced that would eliminate the need for selective assembly," he said. The fact that such methods have to be resorted to "is only an admission that we are capable of inspecting parts much closer than we can make them," he continued.

The answer, he believes, will be found in machinery "which will always tend to make parts in the center of tolerance and within the same spreads that are possible for short periods of time."

He feels that automatic systems of this sort will produce parts of higher quality, with less scrap and with less exacting skills required of the machine operator.

Admit Problems . . . Mr. Jaeger admits that the solutions to these assembly problems will not be easy, either from the technical or the personnel standpoint. He maintains that success will come only with intense cooperative effort on the part of the process engineer, the machine tool builder, the inspector, the gage maker, and shop operating personnel.

He also concedes that consideration must be given to the social problems that may stem from installation of more complex systems. He proposes constant reexamination of personnel training and education programs.

Set New Standard . . . A new American Standard system for the design of straight bevel gears is now a fact.

It is the first revision since 1940 in a system that was developed originally at the Gleason Works and adopted by the American Gear Manufacturers' Assn. in 1922.

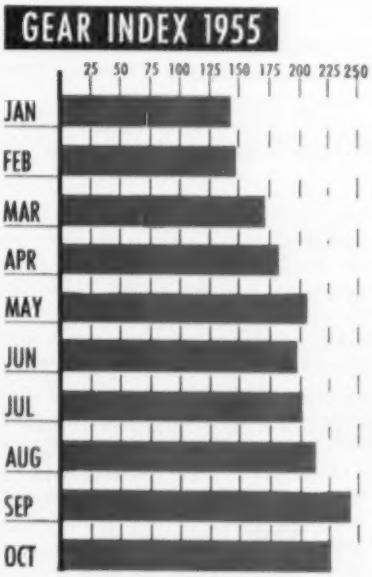
The 1955 revision makes the following changes in the design standard:

(1) Slight increases in clearance and whole depth. These are proportionately greater in the case of fine-pitch teeth.

(2) Somewhat different proportional tooth thickness of pinion and gear for approximately equal strength, as determined by improved methods of analysis and design.

(3) Adoption of 20° as the pressure angle, instead of the previous 14½° standard.

The new system was sponsored by the AGMA and the American Society of Mechanical Engineers. It was submitted to the American Standards Assn. in 1954, was approved by that group and designated as ASA B6.13-1955. Printed copies, priced at $1.00 each, are obtainable from ASME headquarters, 29 W. 39th Street, New York 18.



Base: 1947-49 = 100
Source: American Gear Manufacturers Assn.

Gear Sales Off . . . More news about the gearing industry concerns its business volume for the month of October. Latest monthly report from AGMA's Washington office shows a decrease of 7.7 pct for that period, as compared with September, which was the peak month for the year to date.

The small drop in October can hardly be considered significant. New orders placed with gear makers this year have been consistently ahead of 1954 volume, and even lead the 1953 figures.

For details on machine tool delivery outlook, see Special Report, p. 95.

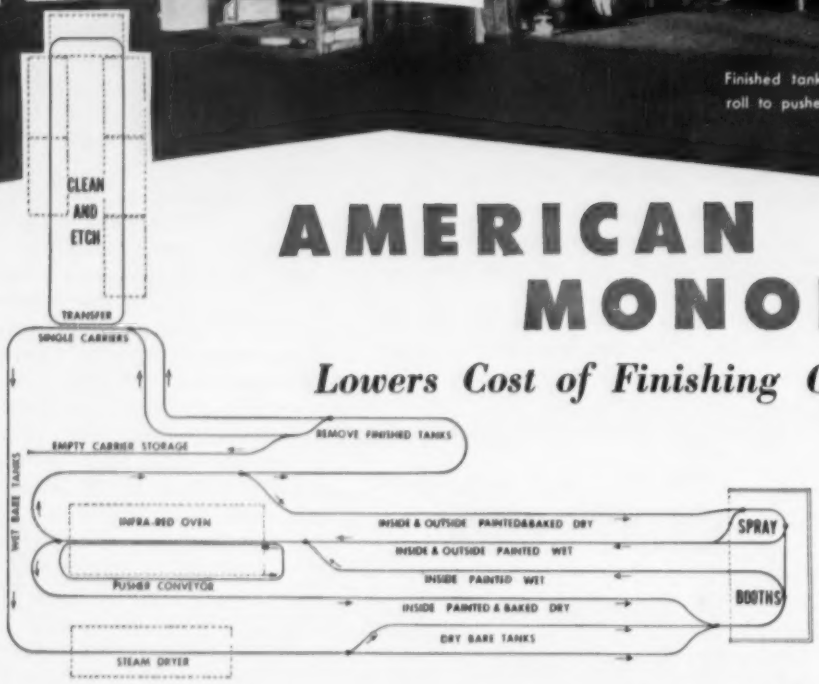


American MonoRail System for finishing water conditioner tanks.

Finished tanks from spray booth (rear) roll to pusher conveyor in foreground.

AMERICAN MONORAIL

Lowers Cost of Finishing Operation



Costs are cut every step from cleaning and etching to finished tanks in this continuous operation by American MonoRail. For this manufacturer the up-and-over system of materials handling boosted production, improved space utilization, cut damages to material and improved both working conditions and production control.

If you have a materials handling problem, call your nearby American MonoRail engineer. He is qualified to help you solve it.

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"Up-and-Over" is the title of our 16-mm. sound film to solve many tough handling problems at low cost. Please allow three weeks to schedule showing.

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The Iron Age

SALUTES

Tom Fitch **He worked his way up from a mill laborer's job to a key position. Then he decided to back a belief all the way. He bought a Sendzimir mill and formed his own steel company.**

When World War II ended, Tom Fitch did what many men think about and talk about. He went into business for himself, buying a 39-inch Sendzimir mill and founding Washington Steel Corp., Washington, Pa.

No one was greatly surprised when Tom made the jump. He believed the Sendzimir mill was ideal for rolling stainless steel and he has a name for going straight down the line on his beliefs. And the success of his company, indicated by a recent order for a 52-inch Sendzimir mill, came as no great surprise. He started at the bottom in the steel business, worked his way up, is credited with perfecting a method for stainless cladding of plates.

He knows steelmaking and he has the personality for leadership. This was demonstrated very forcibly last October when he was drafted to run for mayor of Washington. Nominated by the Republicans in a strongly Democratic county, he still won by a big majority. This didn't surprise anyone either. He's just the kind of a guy to cut across conventional lines—political or otherwise. A while back, he was touring a Midwestern mill with a group of dignitaries. A craneman, who was an old buddy, spotted him and gave a yell. Tom left the tour flat; joined the craneman and held old home week.

In 1931, Tom graduated from Yale and went to Jessop Steel Co. as a laborer. In three years, he advanced to assistant superintendent. Later he was made manager of the composite steel division. During World War II, he was loaned by Jessop to the War Production Board and served in its steel division two years. In 1944, he founded Washington Steel.

He is a director of the American Iron and Steel Institute. His civic activities have included: president of the community chest; co-chairman of the LeMoyne Community Center Building Fund; director of the Washington Hospital; member of the Neighborhood House Assn.; director of the National Board of P-O-N-Y League; vice president of the Pennsylvania Economy League. His full name is Tecumseh Sherman Fitch. He made good on his own.

Marvibond

...the unique process *that combines the strength of metal with the wear-resistant beauty of vinyl film made from Marvinol® resins* for...

ULTRALITE SAMSONITE Luggage*





OF COURSE, YOU don't make luggage, but there is an idea in this suitcase you can probably use! It's the functionally-practical beauty of its *vinyl finish inseparably bonded to the sheet magnesium from which the suitcase was formed.*

The MARVIBOND Process—developed and licensed by Naugatuck—makes possible the bonding of sheets of specially-compounded vinyl plastic to sheets of steel, aluminum, magnesium or other metals. This plastic finish is easily wiped clean, resists wear, exposure, chemicals and oils. After laminating, the flat sheets can be formed, crimped, punched, drilled and sheared very much like ordinary sheet metal.

Just think of all the product applications for sheet metal with a color textured plastic finish... or for plastic reinforced by metal! The possibilities are limitless.

Typical uses for MARVIBONDED materials are wainscoting in hospitals, hotels, schools, offices, playrooms, bathrooms and kitchens; also for cabinets, shower stalls, shelving, office partitions, desk tops, machine housings, radio and television cabinets, house trailers and interiors for buses, automobiles, railroad coaches, airplanes and ships.

Does the idea ring a bell? Then contact us for the names of MARVIBOND† Process licensees who can supply you with Marvibonded laminates for your requirements.

*Made by Shwayder Brothers, Inc., Denver
†U.S. Patent Pending

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

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The Iron Age INTRODUCES



GEORGE R. MILNE, elected president, National Carbide Co., New York.



G. S. CRANE, elected chairman, board of directors, Cutler-Hammer, Inc., Milwaukee.



PHILIP RYAN, elected president, Cutler-Hammer, Inc., Milwaukee.



JAMES D. GLENN, elected vice president, sales, Crucible Steel Co. of America, Pittsburgh.

Donald W. Hill, appointed vice president and general manager, Crown and Closure Div., **Crown Cork & Seal Co.,** Baltimore.

Dr. Charles E. Lawall, named assistant to president, coal traffic & development, **Chesapeake & Ohio Railway.**

John M. Wermuth, named assistant to treasurer, **Acheson Industries, Inc.,** Port Huron, Mich.

E. C. Tinsley, elected vice president, refractory specialties, **Mexico Refractories Co.,** Mexico, Mo.; **Halfred F. Randolph,** appointed manager, Refractory Specialties Div.

Robert F. Schutz, appointed vice president and manager, Ingersoll Kalamazoo Div., **Borg-Warner Corp.,** Chicago.

William O. Bishop, elected superintendent, blast furnaces, **Inland Steel Co.,** Chicago; **Richard J. Wilson,** appointed assistant superintendent, blast furnaces.

Russell W. Grabinsky, appointed assistant superintendent, Small Tool and Gage Div., **The Taft-Peirce Mfg. Co.,** Woonsocket, R. I.

Wallace U. Seiler, named supervisor, solvent field service, **The Dow Chemical Co.,** Midland, Mich.

Myron A. McAlpine, elected superintendent, merchant mills, Indiana Harbor Works, **The Youngstown Sheet & Tube Co.,** Chicago.

Glenn H. Parker, named district sales manager, northern New York state, Berger Div., **Republic Steel Corp.,** Cleveland.

Merrill F. Yale, appointed district manager, **The Lincoln Electric Co.,** Denver area.

Parker Jameson, appointed manager, Dallas Div., **Connor Spring Mfg. Co.,** San Francisco.

Willard F. Bierman, appointed manager, sales and engineering, **Madison Industries Inc.,** Big Rapids, Mich.

Lee H. Clark, appointed vice president, **Pennsylvania Salt Mfg. Co.,** Philadelphia.

John B. Laramy, appointed assistant general sales manager, **Worthington Corp.,** Harrison, N. J.; **Alvin F. Welsh,** named manager, Marketing Research Dept.

Harold N. Lang, appointed general manager, Benwood, West Virginia Works, **Wheeling Steel Corp.**

George W. Herman, appointed assistant plant manager, **American Chain & Cable Co., Inc.,** Bridgeport, Conn.

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• AMERICA'S BEST KNOWN JOB STAMPING MANUFACTURER

James F. Whitney, elected superintendent, Phenolic Products Plant, **General Electric Co.,** Pittsfield, Mass.; **Issac F. Kinnard,** appointed manager, special projects and studies, Instrument Div., Lynn, Mass.; **Mark A. Princi,** named manager, engineering, Instrument Div.; **Thomas O. Paine,** named manager, measurements lab., Instrument Div.; **Anthony G. Polidoro,** named purchasing agent; **Boyette Edwards,** named specialist, operations research projects; **Kenneth L. Laut,** appointed supervisor, manufacturing, varnish plant, Coshocton, Ohio; **Edgar B. O'Hora,** appointed manager, air conditioning, refrigeration and internal sales, Small Integral Motor Dept., Fort Wayne, Ind.

Morin J. Heric, named manager, purchasing, Administrative Dept., Special Products Div., **Ford Motor Co.,** Dearborn, Mich.

John H. Ferguson, appointed assistant manager, credits, **Jones & Laughlin Steel Corp.,** Pittsburgh; **Joe B. Gibson,** appointed special representative, line pipe projects, Tubular Products Div., Pittsburgh; **Albert E. Martz,** appointed staff industrial engineer; **Robert C. Witney,** appointed division industrial engineer, Container Div.; **Dr. Harry L. Bishop, Jr.,** appointed development engineer, process metallurgy, Technical Services Div.

Richard J. Hollmeyer, named district sales engineer, Cincinnati, **Dravo Corp.,** Pittsburgh.

Raymond Funk, named manager, industrial relations, Materials Mfg. Dept., **Westinghouse Electric Corp.,** Pittsburgh; **Stephen J. Pentrack,** named purchasing agent, Materials Mfg. Dept.

William A. Gent, appointed field engineer, Cleveland sales office, **The Warner and Swasey Co.**



DR. MAURICE J. DAY, appointed vice president, research and development, Crucible Steel Co. of America, Pittsburgh.



C. R. RICE, appointed executive vice president, Jessop Steel Co., Washington, Pa.



GEORGE E. MUNSCHAUER, elected chairman and chief executive officer, Niagara Machine & Tool Co., Buffalo, N. Y.



FREDERICK E. MUNSCHAUER, elected president and general manager, Niagara Machine & Tool Co., Buffalo, N. Y.

A FINISH GRINDING OPERATION ELIMINATED BY



STERLING SPEED-TROL!

Speed-Trols on boring machines at Lear, Inc., Grand Rapids, Mich., resulted in elimination of a grinding operation and a reduction in manufacturing costs. This was accomplished through Speed-Trol's infinite speed adjustment and accurate speed regulation which allowed selection of the best cutting speeds for Carboloy or diamond tipped boring tools and boring to extremely close tolerances which obviated the need for a former final grinding operation.

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SEPARATE MOTOR SPEED-TROL DRIVE

For applications requiring separate motor and variable speed transmission.

STERLING ELECTRIC MOTORS

Plants: New York City 51; Chicago 35; Los Angeles 22; Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

John D. Horth, appointed assistant manager, Compressor Sales Dept., **De Laval Steam Turbine Co.,** Trenton, N. J.

Philip F. Hartung, named eastern regional sales manager, **Rigidized Metal Corp.,** Buffalo, New York.

Harlan L. Meredith, appointed staff assistant, **Airline Welding & Engineering,** Hawthorne, Calif.

Fred Hale, appointed account executive, **Wilson, Haight, Welch & Grover, Inc.,** New York.

John R. McChesney, appointed marine development engineer, Product Development Dept., **Kaiser Aluminum & Chemical Corp.,** Chicago.

Alfred R. Rischof, appointed sales representative, Philadelphia and Baltimore, **The Johnson Bronze Co.,** New Castle, Pa.

Paul W. Koenemund, appointed chief engineer, **Wheeling Steel Corp.,** W. Va.

Robert E. Sanford, appointed design engineer, **Erie Foundry Co.,** Erie, Pa.

Richard Smucker, appointed project engineer, Rolling Mill Div., **E. W. Bliss Co.,** Salem, Ohio; **Tom A. York,** appointed sales engineer, Press Div., Rochester, N. Y.

David H. Day, appointed industrial sales staff, **Wyandotte Chemicals Corp.,** Albany, N. Y.

George Krauss, Jr., appointed to Technical Div., **Superior Tube Co.,** Norristown, Pa.; **Rodney G. Utter,** appointed to Mechanical Development Div.

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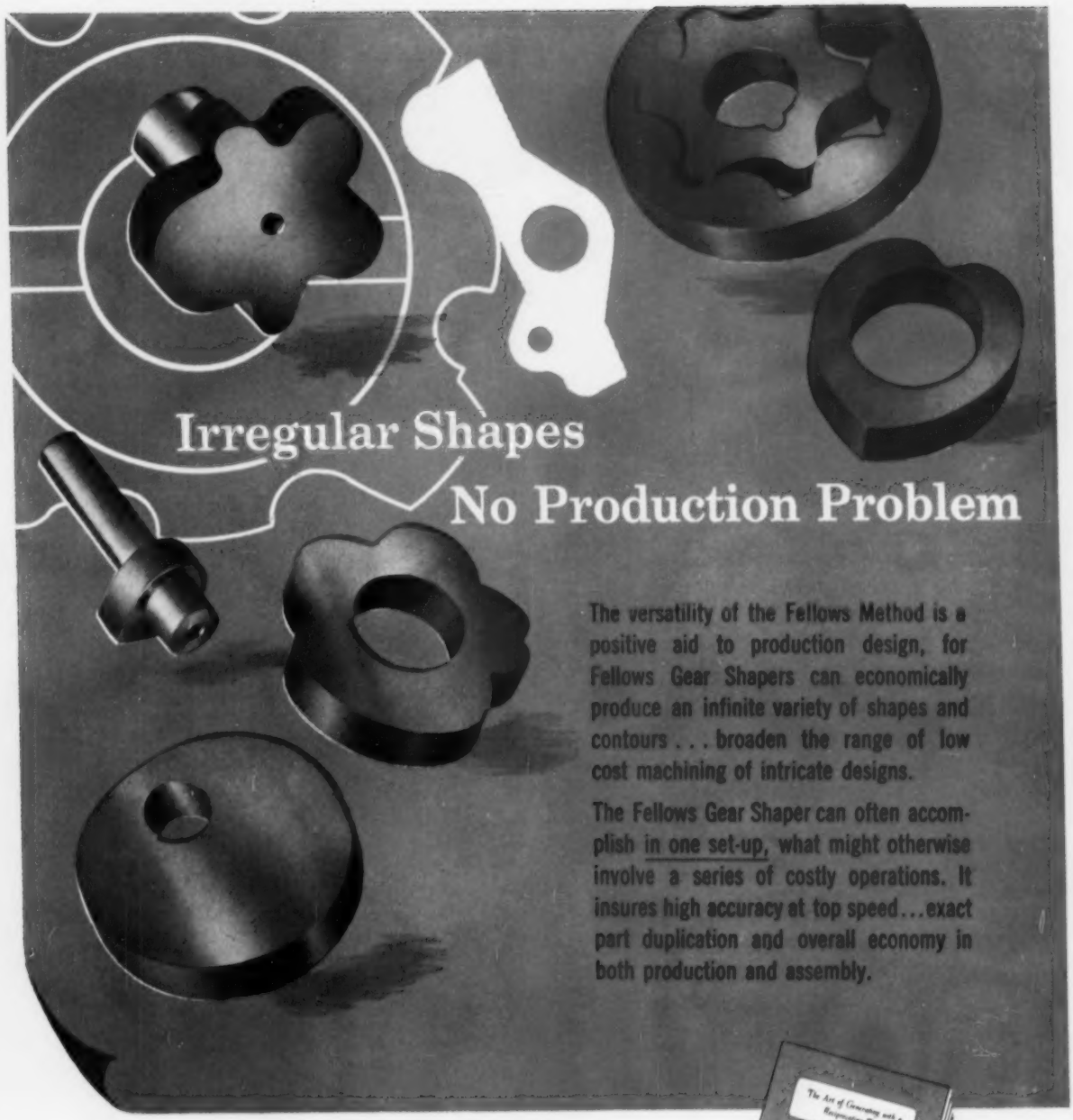
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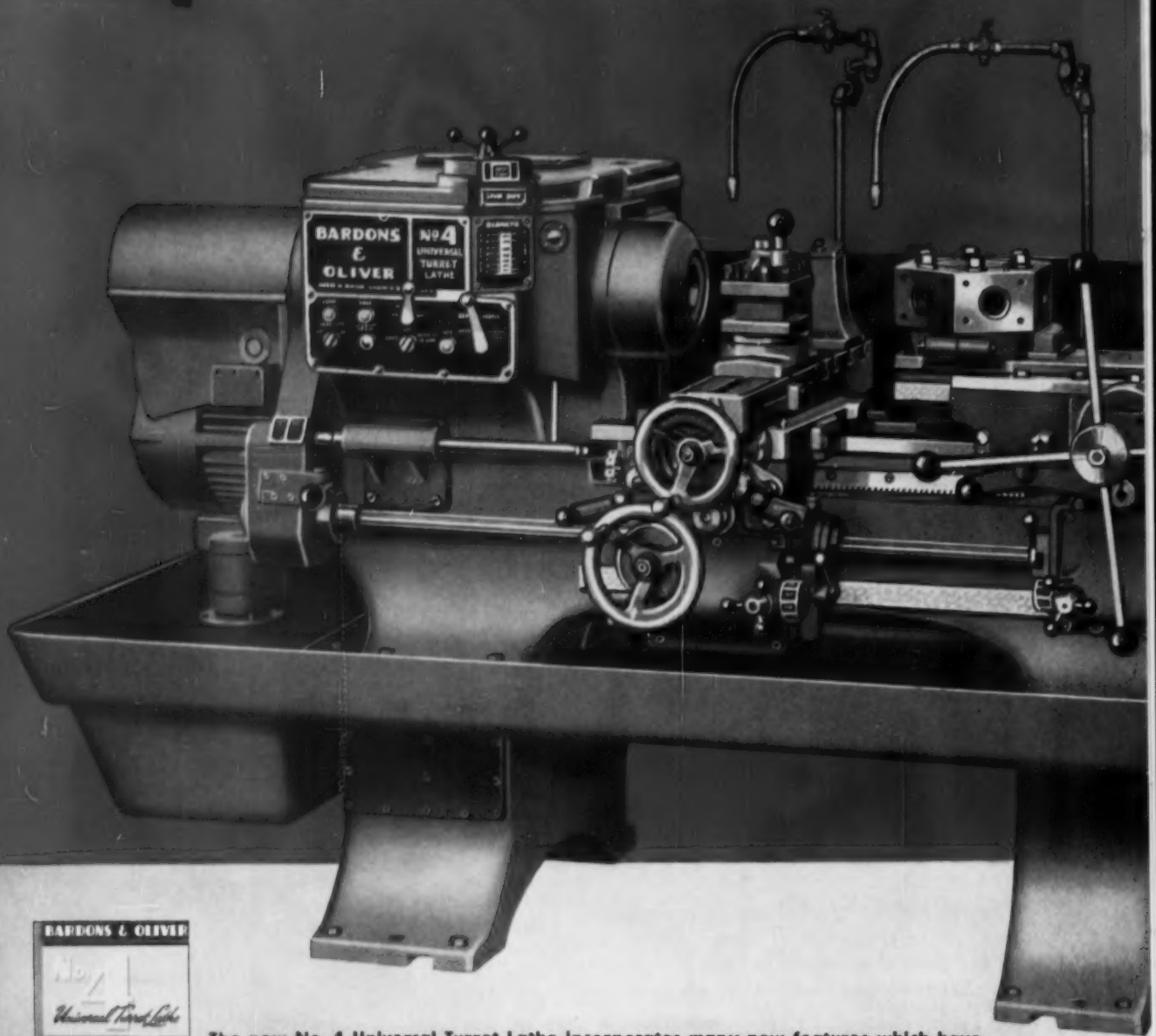
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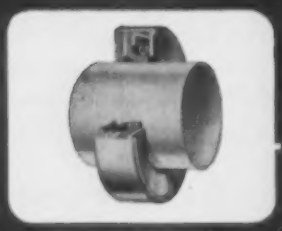
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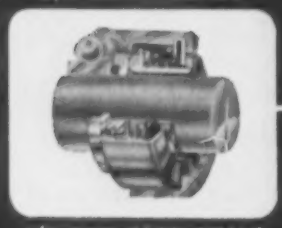
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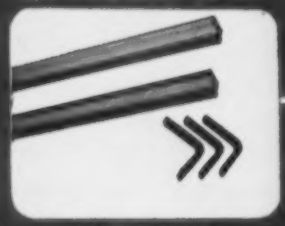
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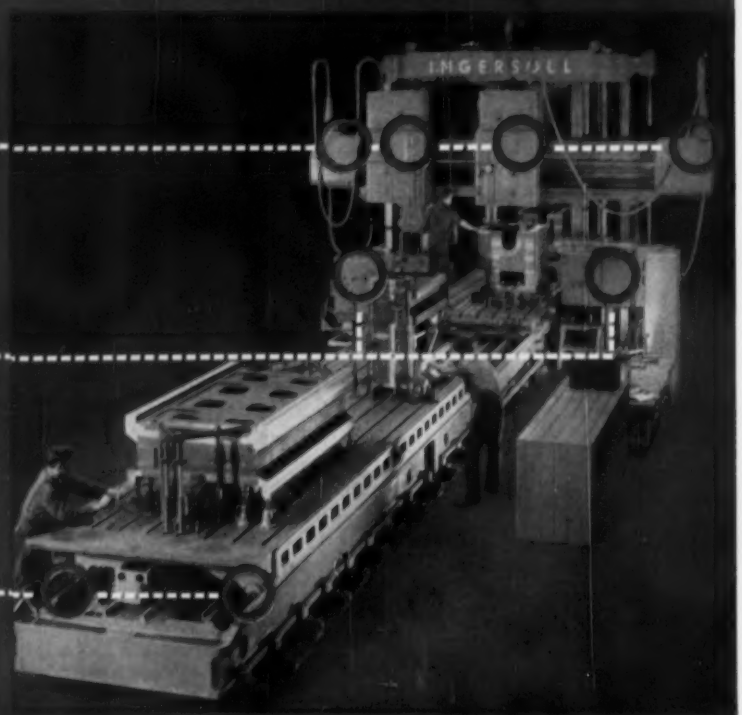
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For top efficiency—

How to Choose the Right Broaching Fixture

♦ Modern broaching practice makes use of a variety of work-holding fixtures . . . Choice of the best one for a particular job hinges on the part itself, production required, machining operations.

♦ Rotary-table indexing fixtures, shuttle types, trunnion devices—they're all good in the right places . . . Here's a breakdown of the most widely used designs with examples of the jobs they do best.

By HARRY GOTBERG, Vice-president, Engineering
Colonial Broach & Machine Co., Detroit

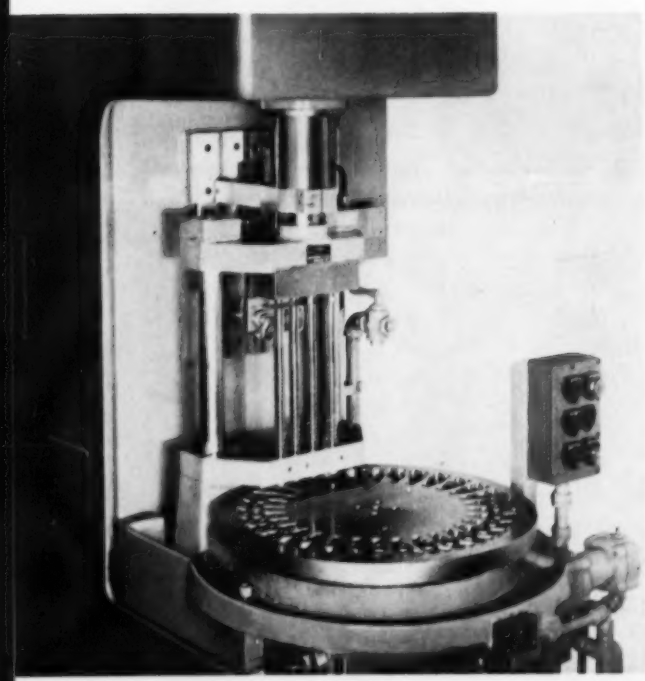


FIG. 1—Indexing table on this 10-ton utility press positions four rocker arms at a time.

♦ THE PROBLEM OF fixturing a broaching machine with loading, positioning, clamping and unloading or ejecting devices involves (1) the workpiece itself; (2) the production rate desired; (3) floor space requirements; (4) the number and type of preceding or subsequent operations, if any.

One type of fixture may permit the simultaneous broaching of a number of parts. Another may be designed to broach different areas of the same part at successive stations. Still another fixture may accommodate parts that have identical surfaces to be broached, but which vary in one dimension, such as length.

Rotary indexing fixtures are used widely for internal surface broaching of large ring-shaped parts; also for internal hole sizing and keyway and spline cutting in relatively small workpieces.

One such fixture (Fig. 1), is used in conjunction with a 36-in. stroke, 10-ton utility press that broaches four automotive rocker arms at a time. Production rate is 1200 per hour, and the complete automatic broaching cycle for each group of four parts is 12 seconds.

The 32-slot table indexes eight times in each

complete revolution. Half of the table slots are always accessible for loading. Finished pieces drop through these slots into a chute after they are broached. Because this setup uses continuous strip broaching in conjunction with burnishers, no additional indexing is needed to accommodate the return of the broaches.

Another rotary indexing table installation aids the broaching of internal contours and lugs on large alloy steel support rings for jet engine blades. Metal removal in some sections is ¾ in. thick and ½ in. deep. Two 10-ton, 90-in. stroke horizontal machines are used, and each makes 18 passes to complete its work. Total production is three rings per hour. A Geneva movement provides indexing and dwell on these fixtures, with positive locking for the broaching stroke.

Matching the trend toward automatic work handling, broaching too, can be combined with other operations in a single machine. Automatic loading and unloading can be included if desired.

One such installation (Fig. 2) handles a sprocket through drilling, broaching and stamping operations. Parts are first stack-loaded six at a time into circular holders on both ends of an oscillating loading arm. An escapement mechanism in each holder drops the sprockets one at a time onto a rotary indexing table. When the sixth sprocket drops, the arm indexes 180° for reloading while the loaded end is brought into position above the indexing table.

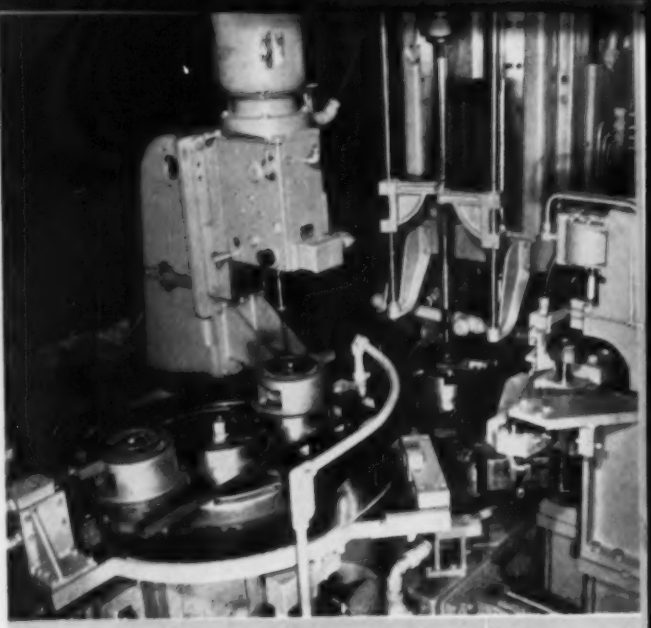


FIG. 2—Loader arm (left) drops sprockets on table for drilling, broaching and stamping.

Output over 200 per hour

The hydraulically actuated rotary indexing table in this setup has four equally-spaced chucks around its periphery. As the table indexes 45°, holes between adjacent chucks allow the broaching tool to be returned after each pull-down stroke.

Cycle on this job is: (1) drill a 0.2656 in. diam hole in the sprocket web, (2) broach a 0.1895 in. keyway in the shaft hole, (3) stamp a timing mark on the part. Production rate exceeds 200 parts per hour.

Another type of fixture that combines rotary indexing with a shuttle movement is used on a 30-ton, 66-in. stroke vertical machine to broach 294 teeth on a 6-ft. diam internal rig gear, Fig. 3. In operation the fixture first moves into position under an 11-tooth, 12 segment surface broach that is 9 in. wide by 60 in. long. After the broach passes through the work, the fixture shuttles back out of cutting position and the tool returns to the top of its stroke. Shuttle movement is through a hydraulically controlled locking cam action.

Hydraulic action also rotates and indexes the large gear blank to the next cutting position. A hydraulically controlled pin locks the fixture accurately, and hand clamps hold the gear blank firmly until it is hydraulically ejected for unloading.

Broached teeth are checked for spacing and size while the gear is still in the machine. The gage is integral with the index fixture and actually passes through the machine column. Total cutting time for this part is 30 minutes.

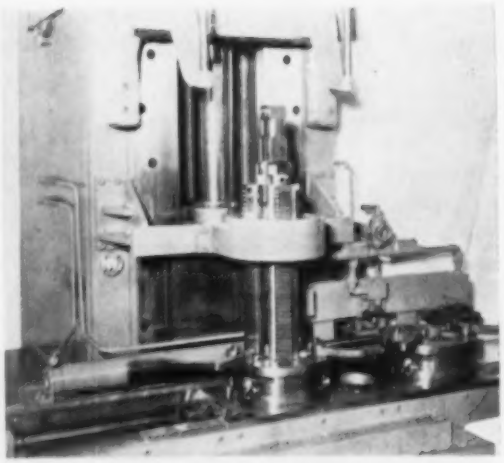


FIG. 4—Two-station shuttle fixture with central opening for broach return between passes.

Plain shuttle fixtures, of both the receding-table and transverse type, also find wide usage in modern broaching. The receding type, with either manual or magazine loading, is used for both internal and external broaching; the transverse type is used chiefly for manually-loaded internal work. Transverse-shuttle units usually have a work holding fixture at each end of the table to facilitate loading during the broaching stroke, and an opening between the work holders permits the broach to return.

One transverse-shuttle, two-station fixture set-

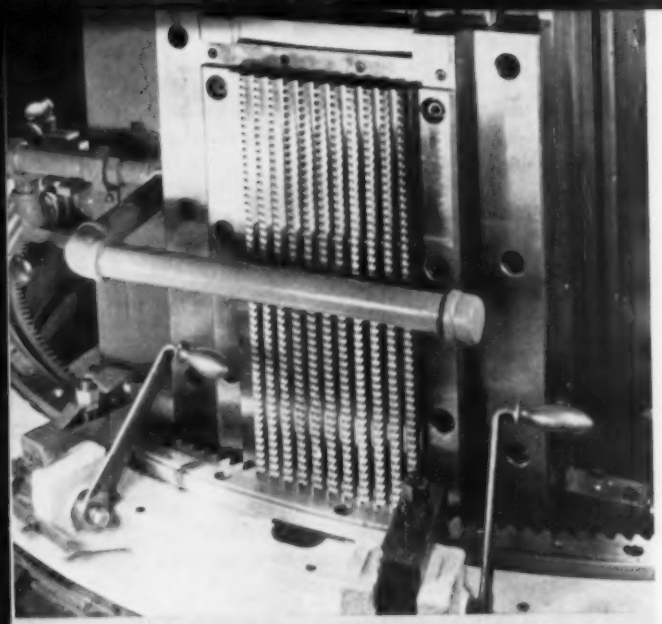
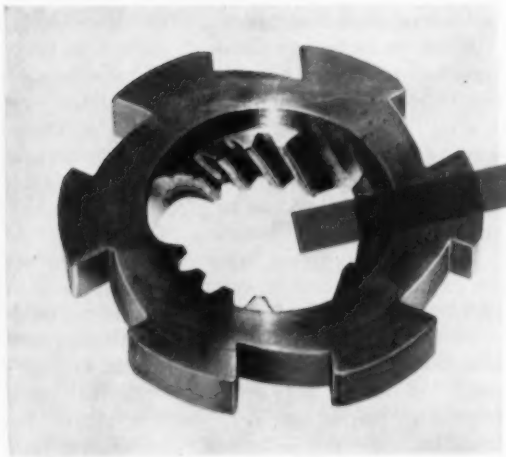


FIG. 3—Section of rotary indexing and shuttle fixture for broaching internal teeth on gears.

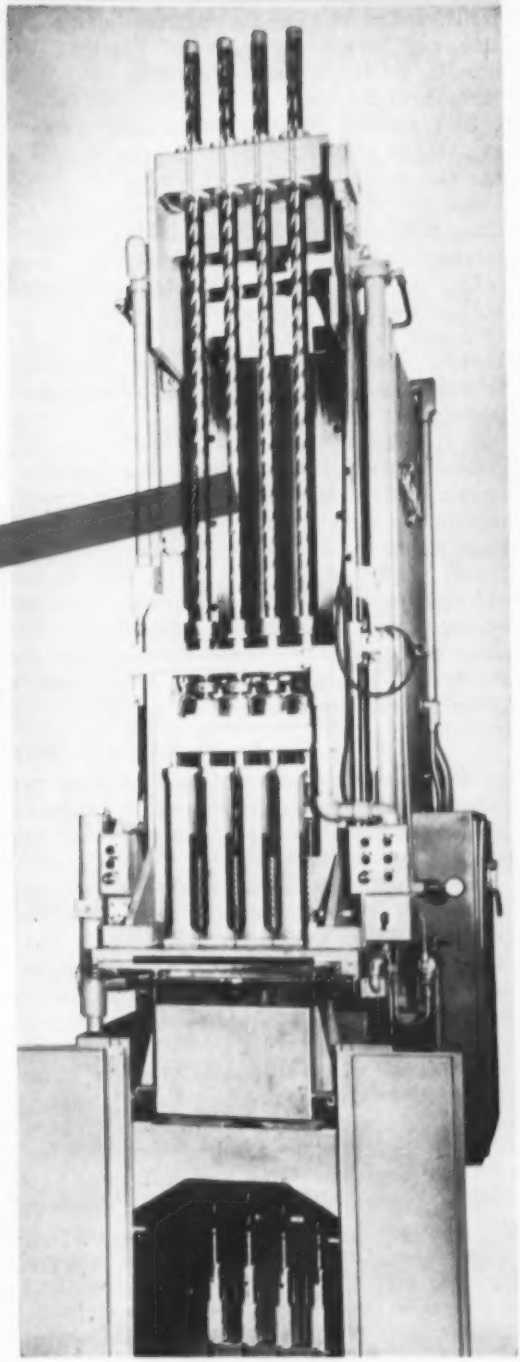


up (Fig. 4) speeds the broaching of intricate internal contours on aircraft engine parts. Six identical contours are made in two passes, three in the first station and the remaining three in the second station. The two-station fixture is necessary for locating from offset holes in the part.

There are 12 dowels in each of the work holding fixtures, six above and six below the work. They engage holes in the part lobes, thus holding these thin walled projections to prevent any distortion during broaching. The shuttle fixture has a central opening through which the broach returns after each pass. All shuttle movements are actuated hydraulically and are controlled and interlocked by limit switches.

For start-to-finish internal broaching where large parts require two passes, one setup minimizes handling with a receding shuttle fixture

FIG. 5—Fixturing on this pull-up machine includes four vertical magazine loaders to speed broaching of the spiral internal splines and grooves on the transmission part (left).



for the work and a transverse-motion shuttle support for two heavy broaches.

Normally such large parts get both a roughing and a semi-finishing pass and then are stacked near the machine until broaches are changed for the finishing pass. This means a four-time part handling plus a broach change, all of which is inconvenient, time consuming and expensive.

With the dual shuttle setup, once the work is placed on the receding type table there is no further handling until the automatic cycle is completed. The work table motion and the action of the broach-support shuttle are electrically controlled and coordinated for work positioning, cutting, and broach retraction and transfer. Hydraulic interlocks insure positive positioning throughout the cycle.

Still another type of simple shuttle fixture mounted on a pull-down machine helps in broaching the inside diameters of automobile differential gear blanks and similar parts. The hydraulically actuated, manually loaded fixture is mounted on the work holding platen.

In this pull-down operation no auxiliary work holding clamps are necessary. The shuttle fixture only locates the part with respect to the broach. Machine and fixture are interlocked for automatic cycling, which, including manual loading and unloadings, is just 12 seconds for each gear blank.

Good fixturing need not be complex even when working with a long part; for example, broaching kingpin holes in truck front axles on a 6-ton, 24-in. stroke special pull-down machine. A simple fixture section at each end of the axle locates and supports it, and despite the length and shape of the part, no clamping is required. Smooth action of the single broach plus the support of the fixture sections are sufficient to hold the work in rigid, accurate position.

Use trunnion type fixtures

After one kingpin hole has been broached, the axle is lifted manually, turned end for end and replaced in the fixture to broach the remaining hole.

For surface broaching on single and dual ram vertical machines, trunnion type fixtures are used extensively. Action of the trunnion positions the fixture for convenient loading and unloading of parts. Rotation of the fixture is usually actuated by an in-and-out movement of a receding table.

An example of the trunion-shuttle type of fixture is one used to broach four pairs of lugs on each of eight small nozzle plates, using a 15-ton, 66-in. stroke, dual ram machine. Each ram carries four broaching tools, and both rams have identical four-station fixtures which locate, clamp and index the eight workpieces automatically.

Two pairs of lugs are formed on each part during the first cutting stroke. The trunnion's shuttle table then recedes, causing the eight fixtures to index 90° so that the second broaching stroke can cut the next set of four lugs on each workpiece. Thus eight complete parts, having a total of 64 lugs, are formed in two cycles of the machine.

In cases where it is desirable to cut on both the forward and return strokes of a mechanical horizontal broaching machine, the answer lies in a trunnion fixture that shuttles the parts between strokes. One example is a fixture that holds and moves two cast iron bearing cap clusters so that carbide-insert broaches can machine them at a rate of 150 sfpm.

Once the two bearing clusters are clamped in the fixture, the machine cycle is started. The work table trunnions into position and is locked in place. This allows the upper one of two horizontal broaches to produce both a half-round section and a qualifying side (for use as a reference point in later machining operations).

Lock pins withdraw automatically

When the first stroke is completed, the fixture shuttles downward 10 in. so that the bottom broach can finish the part faces on the return stroke. Lock pins then withdraw automatically and the table trunnions outward. This returns the part-holding fixture to starting position for unloading and reloading.

When radially symmetrical parts are to be broached internally, they can be loaded automatically through vertical magazines mounted over shuttle type feeding mechanisms. Magazine loading is usually adapted to pull-up type broaching machines, because the part drops off after the pull-through and can be directed onto a conveyor or into a gravity chute.

For example, spiral splines and grooves are production-broached in automotive transmission parts with the help of magazine loading, Fig. 5. A four station fixture is equipped with four vertical magazine loading tubes and also an automatic shuttling device which receives parts from the magazines and positions them for broaching.

After broaching is complete the shuttle retracts. Finished parts drop onto a hinged baffle that directs them into an unloading chute. The operator has only to keep the magazines loaded to maintain continuous output.

Chain loader fixtures are also used to advantage for internal broaching of radially symmetrical parts that are somewhat large and heavy. These can be loaded readily from floor level, and finished parts can be unloaded into a gravity chute or onto a conveyor. Each part-carrying fixture on the chain becomes a work holding fixture when it is indexed into broaching position.

One four-station, front loading, chain conveyor fixture is used for broaching splines in automotive differential side gears at the rate of 800 parts per hour. It is mounted on a 15-ton, 48-in. stroke machine. No clamping devices are required for this setup.

Ultrasonics:

Grain refinement—

Effects on Steel Heat Treatment

◆ The grain refining effect of ultrasonic energy applied to mild steel during heat treatment is important theoretically and commercially . . . It tends to modify the classical theory of how crystals can be altered.

◆ Commercially, ultrasonics provides a new control technique for many heat treating processes . . . By increasing diffusion rates, sonic energy might greatly speed carburizing, carbonitriding, nitriding, and chromizing.

By: H. V. FAIRBANKS, Professor, and F. J. DEWEZ, JR., formerly Research Assistant, Chemical Engineering Dept., West Virginia University, Morgantown, W. Va.

◆ ULTRASONICS, once restricted to use in the inspection crib, has now demonstrated a new and important usefulness in the heat treatment of steel. For—most spectacularly—the application of ultrasonic energy to mild steel during transformation from the austenite phase can produce marked grain refinement.

The new grain-refining development as applied to steel is the result of recent research conducted by the Engineering Experiment Station, West Virginia University, Morgantown, W. Va. It substantially modifies the classical theory that the properties of crystals can be altered only by plastic deformation, alloying, or heat treatment.

The value of a fine grained structure is generally conceded. Mechanical tests have underlined the importance of fine grain even though certain effects of grain size are imperfectly understood. Usually, a finer grain results in a harder, tougher, better wearing steel. It also helps minimize distortion due to heat treatment.

The application of ultrasonic energy during heat treatment presents a brand new combination: the total effect of simultaneously merging both thermal and sonic energy. Essentially, it introduces another dimension to heat treating theory and control techniques. For now sonic energy can be used to modify the normal effects of thermal energy. Thermal atomic motion can be more accurately and efficiently controlled by the introduction of measured sonic interference.

The metallurgical effects of ultrasonic waves have been the subject of numerous investigations. The notion of improving the quality of cast metal by means of a vibrational action during the melting phase is quite old. In recent

How About It?

Hen's teeth and basically new techniques in heat treating have at least one thing in common. That's why our editors are more than a little excited about this article. We hope it sets off a chain reaction of new ideas and ingenious applications among our heat treating friends. And speaking of reaction, we'd like to know *your* reaction to this article. Have you been developing similar techniques in your own shop? Or can you suggest possible applications? If so, send your comments to Metallurgical Editor, The Iron Age.

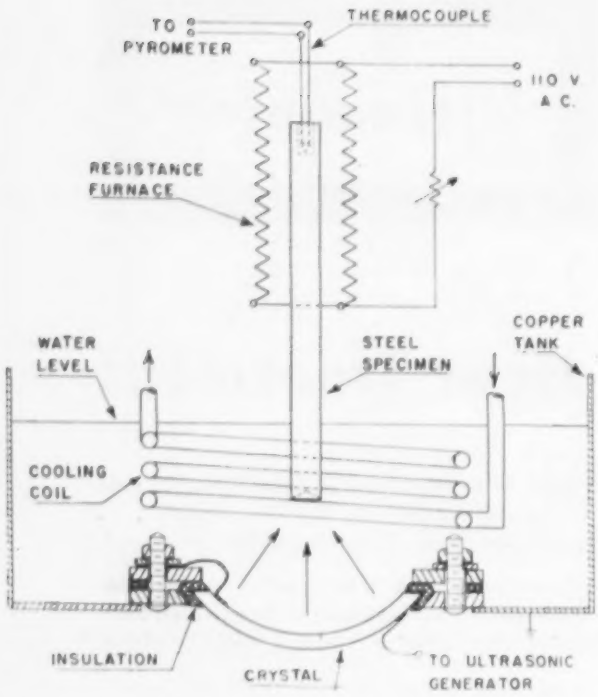


FIG. 1—Schematic sketch of equipment used for the application of ultrasonic energy to mild steel during heating and cooling cycles.

years, the effect of ultrasonic action upon the crystallization of metallic melts has been investigated for such metals as lead, zinc, aluminum, and magnesium.

Some of these studies proved that it is possible to bring about a change in grain size of the metal produced from the melts with the introduction of ultrasonic energy. But whether or not a change in grain size might be brought about in metals which exhibit a recrystallization in the solid state still remained unanswered.

Preliminary work along this line was begun in 1951 by a group of Japanese scientists. Making use of the magnetostriction method, they actually produced grain growth in a hypereutectoid steel containing 1.2 pct carbon.

But since grain growth is highly undesirable and can be readily achieved by severe overheating, this research had little or no practical application. As a result, this early work was regarded as an interesting, but not particularly valuable, scientific curiosity.

Frequencies studied

The prime purpose of the present study was to determine the resulting grain size, crystal structure, and hardness of ferrite and pearlite of a hypoeutectoid (low carbon) steel subjected to ultrasonic energy during polymorphic transformation from the austenite phase to room temperature under a controlling cooling cycle. For purposes of cross reference, a hypereutectoid steel containing 1.05 pct carbon was also tested. The results obtained were reasonably similar to those produced by the Japanese investigators.

Limiting tests to these two steels, the principal variables studied were the frequency and intensity of the ultrasonics. Two frequencies were used: 400 kc and 1000 kc. Intensities were 1.1, 1.7, and 2.5 watts per square centimeter at 400 kc. At 1000 kc, the intensities were limited to 1.1 and 1.7 watts.

Some energy applied

These combinations were calculated on the basis that 88 pct reflection is obtained at a water-steel interface. Due to possible cavitation and losses in transmission through the steel, the ultrasonic intensities actually reaching the heat-

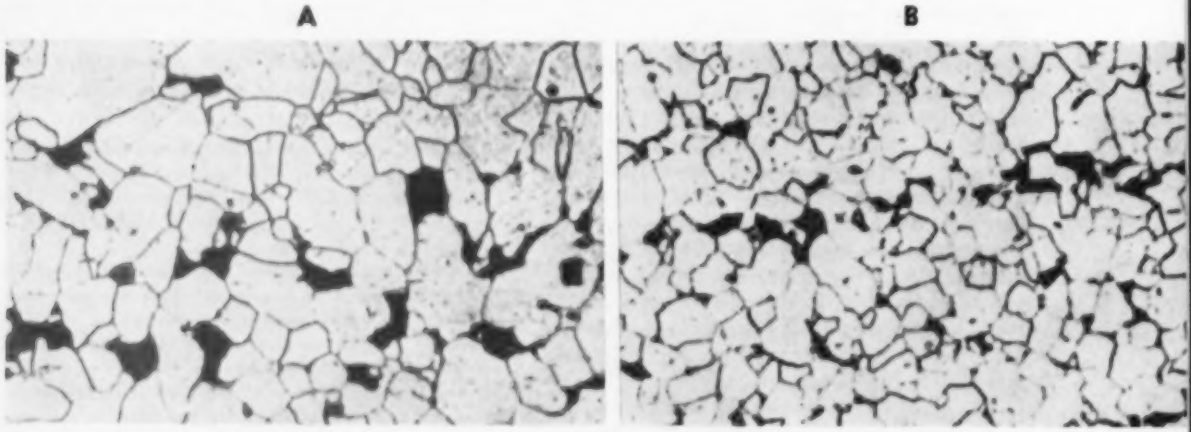


FIG. 2—Note the marked grain refinement produced by sonic energy (b) as compared to grain size in conventionally treated specimen (a).

treating end of the samples may have been considerably lower than those calculated.

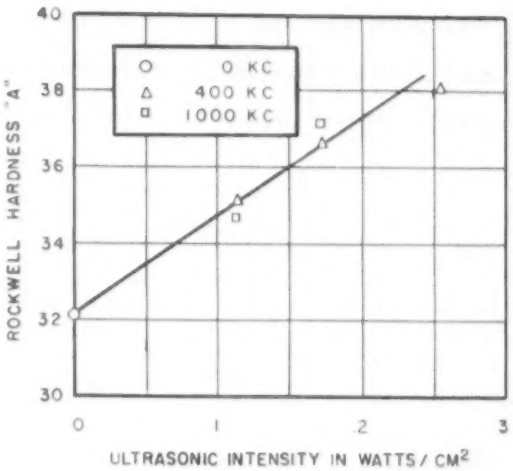
The steel samples used were made of ½ in. diam rods approximately 8 in. long. A cone with an apex of ⅛ in. was machined into one end of each of the steel rods. This was intended to decrease the back reflections of the ultrasonic waves.

Control critical

Temperature control was a critical factor in the results obtained. For this reason, a ⅛ in. hole was drilled into the heat-treating end of the sample to a depth of ½ in. This provided for the placement of a thermocouple which was connected to a recording pyrometer.

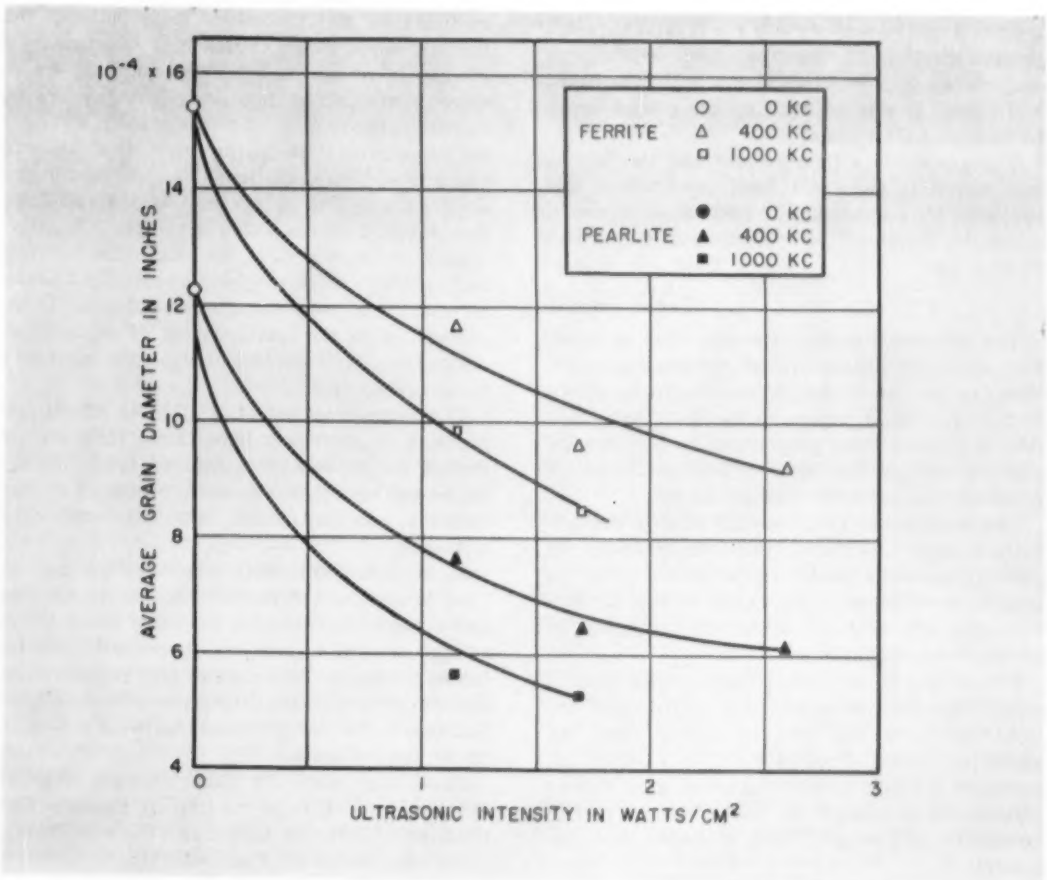
All samples were first heat treated by heating to 1800°F for 2 hours and then furnace cooled. This treatment removed residual stress and put each steel sample of the same carbon content in identical condition.

The steel samples were then given the following heat treatment: (a) heated to 1760°F at a rate of 115°F per minute; (b) held at the austenitizing temperature (1760°F) for 5 minutes; and (c) cooled from 1760°F at the rate of 17°F per minute and from 1130°F to room temperature at 70°F per minute.



Above: FIG. 4—The application of ultrasonic energy during transformation from the austenite phase produced a noticeable effect on hardness.

Below: FIG. 3—The effect of ultrasonic energy on the pearlite and ferrite grain size of 0.07 pct carbon steel during polymorphic transformation.



The commercial potential of ultrasonic effects are not limited to heat treatment of steel, but find important application to carburizing, nitriding, chromizing . . .

Ultrasonic energy was applied to the samples during steps (b) and (c) of the heat treating cycle. For each run made with ultrasonics, a similar heat treating run was made without ultrasonics in order to obtain a reference sample for comparison.

Both the reference and test samples were then ground along their length, polished and etched. The prepared area was photomicrographed, tested for hardness, and the grain size measured.

A bowl-shaped piezoelectric crystal of barium titanate was used to introduce the ultrasonic energy into the sample. This energy was coupled to the sample by means of distilled water from which the air had been removed by boiling for 15 minutes to prevent cavitation.

An air interface was used as a backing for the crystal, since it reflects 100 pct of the ultrasonic energy. This gave the maximum power output in the direction of the water coupling.

The particular shape of the crystal caused the ultrasonic waves to be focused at a point. The focal point of each crystal was found by measuring the depth of water above the crystal required to give the highest water fountain. The sample was placed in a movable clamp with the coned end down. It was adjusted at the proper depth by means of a template.

The crystal was then excited and the sample was moved to the exact focal point which was indicated by a minimum of surface agitation. A schematic sketch of the equipment used is shown in Fig. 1.

Grain refined

The ultrasonic treated samples were of much finer grain than those used as reference samples. This can be seen in the photomicrographs shown in Fig. 2. Fig. 3 points up the fact that grain refinement was more pronounced in both ferrite and pearlite crystals when either the ultrasonic frequency or intensity was increased.

The application of ultrasonic energy consistently brought about an increase in hardness. In general, hardness tended to increase directly as a function of intensity as shown in Fig. 4. Significantly, the effect of ultrasonic frequency on hardness was negligible.

The effects of ultrasonic energy upon certain crystallographic characteristics of the steel are linked to the effects of slow cooling from the austenitic phase. From 1760°F to 1300°F, the austenite crystals slowly transform into ferrite crystals. It is possible for more than one ferrite crystal to be produced from a single austenite crystal.

The ferrite, incapable of dissolving appreciable amounts of carbon, leaves the carbon dissolved in the remaining austenite. Ultimately, the austenite becomes saturated with carbon. Saturation is reached at the eutectoid point at a temperature of 1300°F with a carbon content of 0.8 pct.

The austenite is transformed into pearlite upon further cooling. This structure consists of alternate layers of ferrite and iron carbides. Cooling to room temperature causes no further changes other than contraction of the solid.

Two effects are noted when ultrasonic energy is introduced during polymorphic transformation: (1) grain size is altered, and (2) the thickness of ferrite and iron carbide layers in pearlite is changed. With the 0.07 pct carbon steel, the application of ultrasonic energy during transformation appears to both increase nuclei formation and inhibit grain growth.

Effects explained

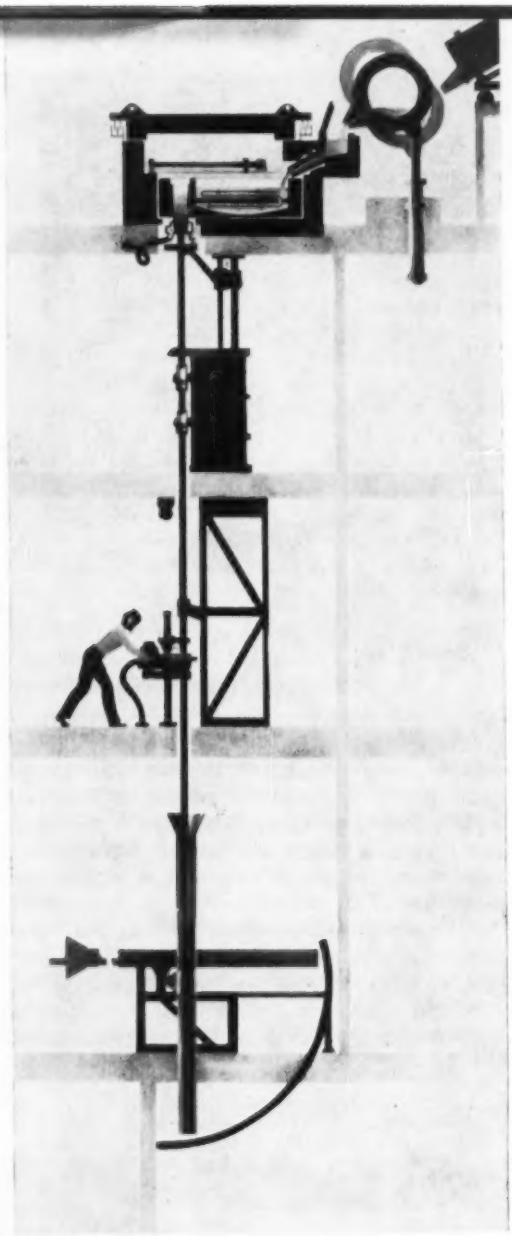
An explanation of these effects is admittedly hypothetical and tentative. It is believed that the ultrasonic waves caused groups of atoms to vibrate in resonance with the frequency of the wave motion. The higher the frequency, the smaller is the number of atoms capable of vibrating in unison. Increasing ultrasonic intensity tends to increase attainment of the equilibrium atomic group size by overcoming the more random effect of thermal atomic motion.

At least two effects of the application of ultrasonic energy can be proposed as being reasonably certain. The rate of atomic diffusion is increased. Also, the establishment of an equilibrium grain size is dependent upon the ultrasonic frequency applied.

The commercial potential of these effects may prove to be extremely important. They are not limited to the heat treatment of steel, but find important application to such processes as carburizing, carbonitriding, nitriding, and chromizing.

It is conceivable that sonic energy may be used to control thermal atomic motion in steel and other alloys in much the same manner that voltage is used to regulate thermionic emission in vacuum tubes. This analogy may require modification in the light of theory yet to be developed. But actual test results appear to favor the validity of the comparison.

Since high and low carbon steels undergo different processes in cooling, it appears that the atomic diffusion factor and the equilibrium grain size factor vary accordingly.



To 9-in. diam—

Continuously Cast Large Bronze Shapes

◆ Quality bronzes for bearings and other uses are now cast continuously in round or more complex shapes up to 9 in. diam . . . Smooth surfaces and close tolerances are produced by water-cooled graphite dies.

◆ A gravity-feed, bottom-flow casting technique prevents dirt and dross entrapment . . . Product lengths run up to 16 ft can be ordered to exact lengths to minimize scrap-end losses in machining operations.

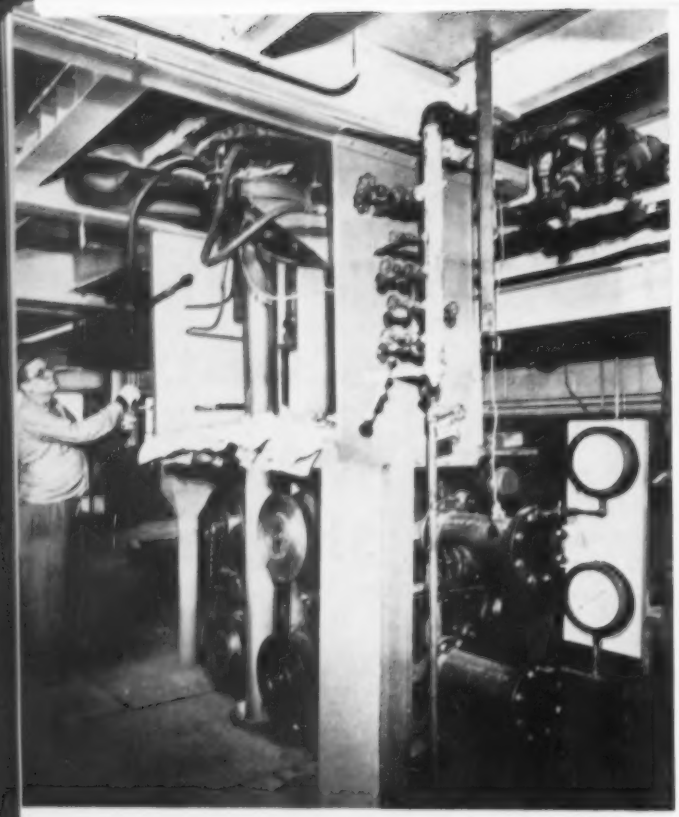
SCHEMATIC of the new four-story continuous casting unit for 5 to 9 in. diam material.

◆ CONTINUOUS-CAST SHAPES of bronze alloys are now produced in sections from 5 to 9 in. in diam and up to 105 in. long at American Smelting & Refining Co.'s Barber, N. J. plant. Aim is to offer makers of large bronze bearings, bushings, gears and other parts stock sizes that can be machined with minimum waste of time and material.

Previously, diameters of the firm's continuous-cast bronze alloys ranged between 7/16 and 5 in. And until the new, larger casting apparatus was installed, shapes over 5 in. in diam were available only as sand, permanent mold and centrifugal castings. Stock lengths of these cast products were usually 12 or 13 in., and the castings themselves were subject to typical foundry defects, inclusions and the like.

Now, however, molten bronze flows continuously into water-cooled graphite dies, freezes, and emerges cast to size. Finished lengths run as long as 16 ft within the 7/16 in. to 9 in. diam range. Shapes vary from true round to more complex and are ready to use "as cast".

The bronze product in the new, larger size range is similar in all respects to the universally accepted small diameter continuous castings. It can be bought in long lengths to slice as required like a loaf of bread; or it can be bought in the exact length needed for an individual part. Scrap end losses are held to a minimum; this is especially important where a 1 in. scrap end may weigh more than 16 pounds.



CASTING solidifies in water-cooled graphite die (top) and is withdrawn by rolls below.

Only a minimum of machining is necessary since each ready-to-cut length is cast with a profile approximating the shape needed. Moreover, uniform quality of these shapes is aimed at eliminating much of the difficulty that specialized machine tools often have in achieving high production rates; especially when working with individually rough-cast pieces that are subject to a variety of foundry defects.

Asarco's g r a v i t y - f e d bottom-flow casting method prevents the trapping of dirt and dross. Sand inclusions are, of course, eliminated entirely. Foreign matter floats on top of the melt and is not carried into the product. Freezing from the bottom upward permits the escape of any dissolved gases which could cause porosity; there are no blow holes, or hard or soft spots. As a result, user benefits can include (1) longer tool life, (2) faster production, and (3) no rejects because of metal quality.

Boosts impact strength

By excluding impurities, and by using a rate of chill which improves the uniform dispersion of alloy constituents, the continuous-casting process raises fatigue characteristics by 33 to 100 pct over those of the same alloys produced by other casting methods. Impact strength is increased 15 to 100 pct, and there are accompanying improvements in tensile strength, yield strength, and hardness.

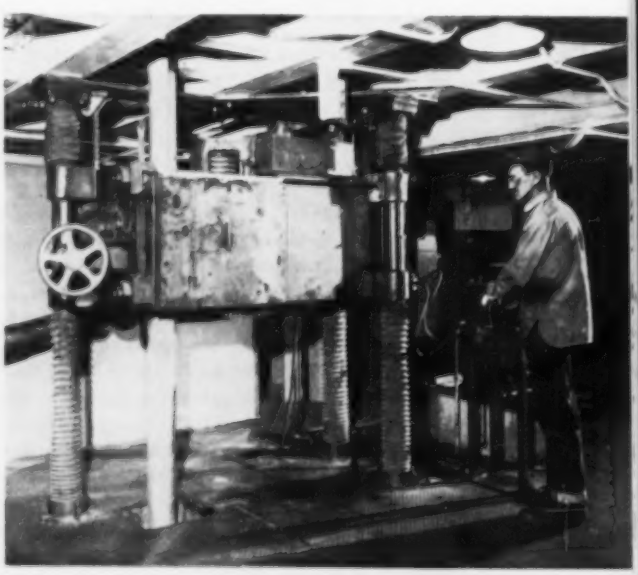
Five 4-story high vertical production lines operate around the clock to create an uninterrupted flow of continuous-cast bronze.

Batch melts from Detroit electric arc furnaces go to a casting furnace equipped with a crucible large enough to accommodate variations in supply. A tortuous metal flow path in this furnace insures deoxidation and degasification, and cushions sloshing effects in pouring into the die (mold) chambers. Metal enters the die chamber from the main reservoir of the crucible through one or more small connecting passages and flows into the die by gravity. Upon reaching the water jacketed length, very rapid solidification occurs; the excess heat is extracted by additional secondary jackets where necessary. The casting then descends through a roll drive which governs the speed of withdrawal. A saw below the roll drive cuts it to the desired length.

Rocking furnace mixes bronze

Due to the large variation in the dimensions of the products cast, two different melting capacities are provided, ranging from 150 to 250 kw. The lip-tilting arc furnace on the king-size casting line has a capacity of 1500 lb per hour. The rocking action of the furnace (up to 250°) helps assure proper mixing of the high leaded bronzes.

Each furnace has an indicating watt-hour meter, and the melter in charge shuts the current off after the desired energy input has been reached. When the molten alloy is at proper temperature, the melter pours it into the casting crucible.



AS THE cast bar or tube descends, the cutoff saw or wheel travels downward with it.

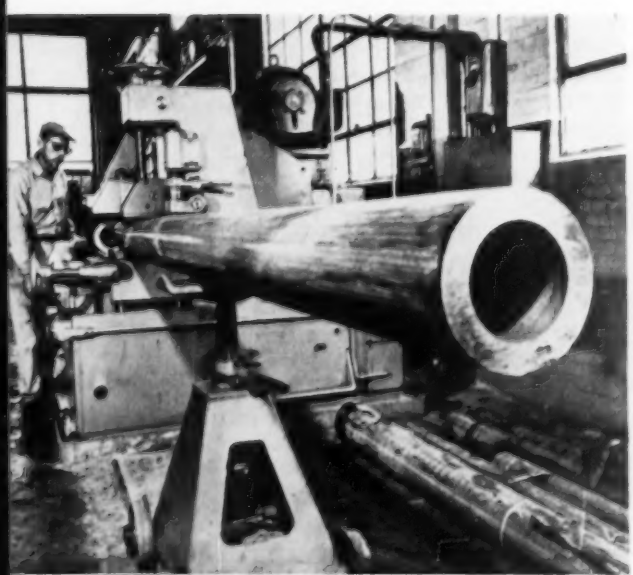
The casting furnace provides the desired control of temperature and deoxidation and, above all, a means for accommodating the mold die and supplying it continuously. The furnace shell is of welded construction and the cover is double-sealed in sand to retain the nitrogen atmosphere.

The casting furnace on the king-size continuous line will hold a 2500 lb melt. Thermal insulation is obtained from a lining of 3000°F insulating brick. Just above the top of the crucible, the brickwork is stepped back to form a shelf upon which the resistors rest. A four-length grid of graphite electrodes is used to control metal temperature. It enters and leaves opposite sides of the furnace by means of water-cooled copper terminals. It is powered by a single phase alternating current supply carrying a transformer regulator for the necessary control.

Pouring boxes are custom molded of clay and graphite. These boxes receive the metal stream from the melting furnace and conduct it through an integral tube to the crucible.

The molds (dies) are machined from high density graphite and are used but once. Their average life is 24 hours, and they are relatively inexpensive. Some dies show no measurable wear even after a week of continuous operation.

The inside die surfaces are usually provided with one or more of a variety of tapers, the design of which depends largely on the alloy and shape being cast. Rod dies may contain one, two, three or five holes, depending on the size of the product and the quantity desired. Such arrangements call for special driving rolls and their use is a matter of economics.



LONG lengths of 9 in. diam continuous-cast bronze are sawed to customer requirements.

Tube dies are constructed on the principle of the bridge dies used in extrusion processes with the very important difference that the bridge is completely surrounded by molten metal. The rigid, short-couple mounting of die and mandrel makes for unusually close control of tubing wall thickness. In several, this thickness varies not more than ± 1½ pct of its nominal dimension.

The fact that the mold is not constructed or assembled as an integral part of the jacket is an important feature of the process. This permits maximum flexibility in using a large variety of die sizes and shapes in a standard series of permanent jackets which cost much more. Consequently, special sizes and shapes and small quantity production runs are commercially practical.

After a die and jacket are installed, a plug of the same size and composition as the material to be produced is inserted in the bottom of the die. The lower end of the plug is attached to an aluminum "starting rod" of the same diameter, which is made in sections for easier handling. The starting rod is strung through power-driven rolls where it is firmly gripped.

Gripper rolls hold 6000 lb

Molten metal is then introduced. When the metal from the holding furnace welds itself to the plug and begins to solidify, the roll drive is started at a predetermined speed. This sets the casting cycle in motion and roll speed is then adjusted to the desired range. A strong pressure is maintained on the gripper rolls because they support the weight (as much as 6000 lb) of the solid bar or tube (200 lb per ft of 9 in. diam.)

Meanwhile, the operator views instruments which indicate or record the furnace and water temperatures, the pressure of the inert furnace atmosphere and the casting speed.

Driving rolls mounted about five feet below the die withdraw the solidified product continuously at a controlled speed. After leaving the roll drive, the casting enters the saw floor where it engages a cut-off saw at proper intervals. The saw works as it travels down with the casting, cutting the stock to order length.

The saws use either abrasive wheels or metal blades as desired. New, unbreakable abrasive cut-off wheels are used for 90 pct of total production at elevated temperatures.

The king-size casting unit is equipped with a 30 in. diam metal saw blade, driven by six V-belts at 850 rpm. It is brought to bear against the work-piece by a hydraulic system. Cut-off sections drop into a tilting receiver and are rolled out into tables for inspection.

Small-size bars or tubes can just hang down as they are cut off. But the big ones cannot be dropped off; a hydraulic jack is needed to handle them—something akin to the recoil buffer in an artillery field piece. All products destined for use as-cast are finally sent to a straightening machine for truing up within tolerances. This operation helps cut machining even more.

High production setup—

Temperature-Indicating Material Used For Weld Inspection

◆ A new, fast method of weld inspection uses an optical scanning device and a temperature-indicating material . . . It is well-suited to automatic production by inert gas-shielded arc welding.

◆ Since optical inspection gives almost instantaneous response, as many as 12,000 welds can be examined per hour . . . Cost of the process is low . . . Equipment is easy to install and operate.

By D. LICHTMAN, Physicist, Airborne Instruments Laboratory Inc., Mineola, N. Y.

◆ HIGH-SPEED assembly has been given a big lift by automatic welding methods. However, in some instances, faster weld inspection techniques are needed to keep pace with the higher welding speeds. Recently, a non-destructive test was devised which lends itself exceptionally well to automatic production by inert gas-shielded arc welding.

The welding procedure calls for placing the two pieces of metal to be welded in intimate contact for good thermal transmission. Heat is transmitted from one piece to the other by conduction. The weld is made when both pieces reach the proper temperature. This procedure has been set up for automatic cycling.

At the higher welding speeds, the operator could no longer watch the welds as they were made. An inspection technique had to be worked out. One of the large automobile producers faced with this condition presented the problem to Airborne Instruments Laboratory, Inc., Mineola, N. Y.

Requirements for the automatic inspection called for (1) examination of as many as 12,000 welds per hour, (2) reasonable cost, (3) ease of installation and operation, and (4) inspection equipment should not interfere with existing equipment.

Many possible methods of detecting flaws in the welds were studied. These methods were then analyzed thoroughly as to their suitability for fulfilling the requirements. Where possible, experiments were performed for further evaluation.

Most methods thus examined were rejected because they failed to satisfy one or more of the requirements. These methods included mechanical deformation and subsequent counting; ultrasonic techniques—including pulse reflection, frequency modulation, steady-state impedance, and transmission of ultrasonic energy; r-f transmission termination; dc-resistance measurement across the weld; and mechanical resonance of the welded piece.

Checks welds optically

One obvious test method would be to submit the completed method to a specified overload stress, then observe whether any parts break loose. This could be accomplished by either fluid coupling or direct mechanical coupling with suitably designed equipment. However, this test method may weaken a good weld. Therefore, it would be considered only as a last resort.

It was then assumed that if a good weld is obtained, the opposite face of the second piece of metal must have reached a certain minimum temperature. It seemed logical, too, that a good weld could be determined by the use of an appropriate temperature-indicating material. If the temperature change could be observed optically, a relatively simple optical scanning device

could then be developed for fast inspection.

Various materials were tested to determine their suitability as temperature-indicating mixtures. The basic material first used was barium carbonate, since this material has a decomposition temperature of about 1400°C, which is close to the melting point of steel. The barium carbonate was mixed with a suitable vehicle to obtain reasonable adhesion to the metal surface.

Forms black oxide

The actual welding process was simulated by heating the back of the coated metal with a very sharp hydrogen flame until the metal started to melt. At the point where the heat has been applied, the temperature-indicating material evaporated, leaving a black metallic oxide coating. The surrounding metal, however, was still coated with the original white material. Different amounts were applied to the metal. These tests showed that the metal could be heated to a considerable degree without causing deterioration of the indicating material, providing that the temperature did not reach the melting point of the steel.

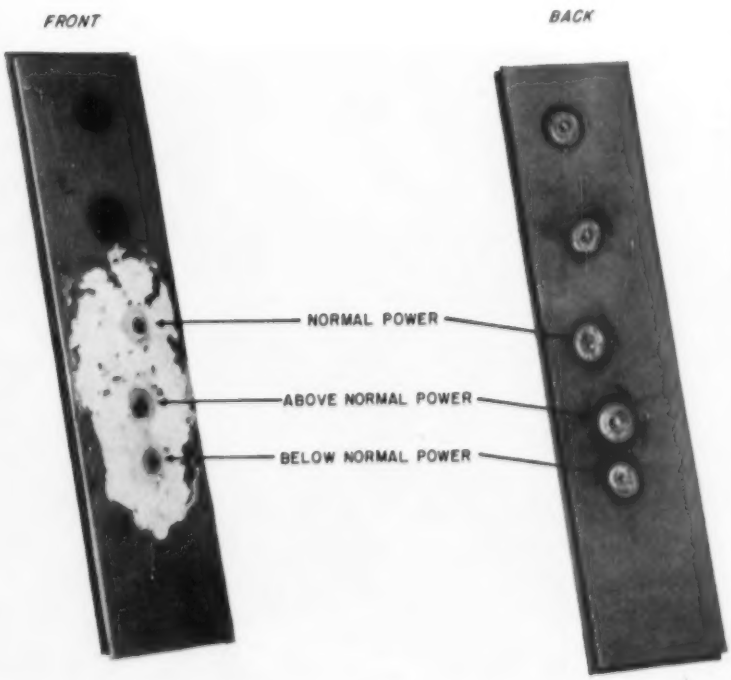
Several materials seemed satisfactory for temperature indication. However, it was necessary to determine empirically the minimum temperature at which a good weld is made in actual welding practice before selecting an appropriate material. The material used is normally white to obtain variations from the black oxide which forms when the proper temperature is reached.

At this stage, three welds were made using the regular welding equipment: one at a normal current, a second using above-normal current, and a third using below-normal current. A decided difference was noted in the appearance of the weld made with below-normal current, a condition somewhat analogous to a poor weld.

The weld inspection procedure consists of these steps:

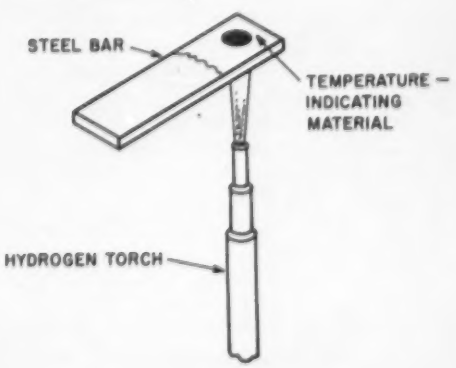
1. Prepare proper mixture according to specifications.
2. Apply mixture to proper surface of metal by spray or brush.
3. Inspect surfaces just before placing parts into welding mandrel, making certain that each is properly coated.
4. Weld the unit.
5. Inspect completed unit visually, or in production by an automatic optical arrangement.
6. If signal output of inspection equipment is above a cerain level, indicating that the metal has not reached proper temperature, a mechanism can be actuated to reject the part.
7. Any excess temperature-indicating material is removed by a quick acid dip and water rinse.

This procedure satisfies all the production requirements. It easily handles the number of welds made per hour since optical inspection gives almost instantaneous response. Cost of the process, including optical and electronic equipment, is quite low. The method is simple and does not interfere with the welding equipment.



Left: **SPECIMEN shows variations in temperature-indicating material for welds made at different current levels.**

Below: **TEST PIECE with temperature-indicating material.**



5-ft wheel—

Precision Dies Stamp Difficult Contoured Part

◆ A 1½-ton punch insert machined to exact contours, is used to form an intricate sheet steel wheel five feet in diameter . . . Surface at completion of drawing operations is scratch-free and smooth, eliminating the need for further finishing . . . Manufacturing costs are 80 pct lower than the original cost of spinning the part.

◆ COST CUTTING effects encouraged multiple changes in fabricating an intricately-curved sheet metal wheel five feet in diameter. The wheel is an essential component in a complex automatic Pinspotter used in bowling alleys. It incorporates sweeping contours difficult to stamp with mass production dies and time consuming to produce with low-cost tooling.

Engineers at American Machine & Foundry Co., Selby, O., evolved a successful design meeting both cost and performance requirements. The 5-ft wheel now is stamped as an integral part at less than 1/6 the original cost. Mullins Manufacturing Co., Warren, O., produces the stamping.

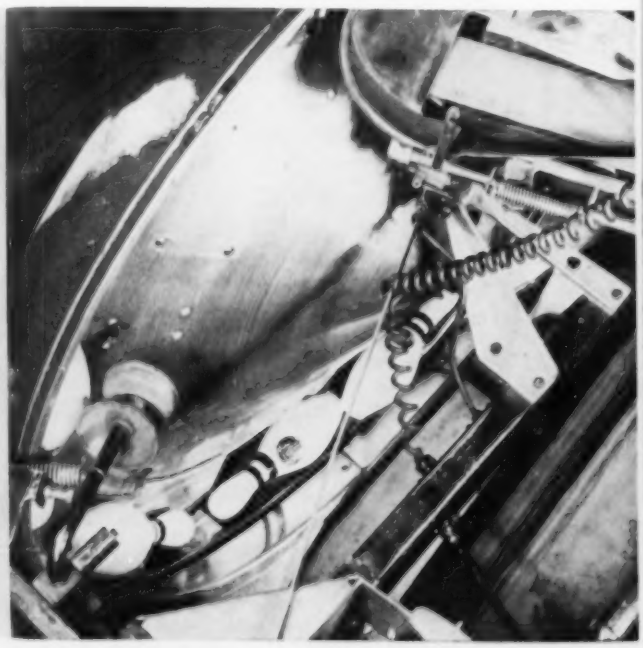
Spots pins on bowling alley

The contoured wheel is drawn with a cone-shaped web and a flared rim to perform an important function on the automatic Pinspotter. It arranges the bowling pins in an orderly manner and elevates them from the pit to a distributing mechanism that functions as a bowling alley pin-boy does in spotting the pins properly for the next ball.

Final design called for a substantial investment in precision contoured and machined punches and dies. Interchangeable left- and right-handed dies are used since the belt-driven wheel rotates in either direction when mounted.

A 1½-ton punch insert is employed to bring the contours to their final shape. The punch and dies impart a scratch-free, smooth finish that

PINS are swept from bowling alley into pit. Pockets in elevating wheel pick out pins one at a time from jumble, carry them upward, and release them into a distributing mechanism.



eliminates the need for further surfacing operations.

Initially, the company's engineers designed the part for spinning. Separately-stamped aluminum pin pockets were riveted to the wheel rim after completion of the spinning operation. The spinning employed low-cost tooling, although a premium price per piece was involved.

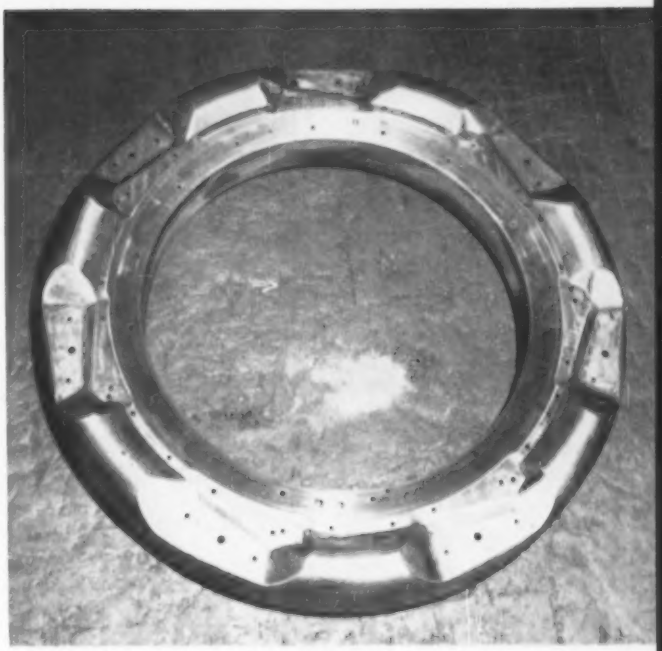
Costly spinning

The spun part performed well, but its close dimensions were difficult to maintain and cost was high. To overcome some objections to the original part, and for better dimensional control, a stamping was substituted for the original spinning.

Pin pockets still were formed separately and attached to the stamped wheel, thus retaining the advantages of low-cost tooling. But both the large stamping and the pockets displayed denting and deformation, requiring an improved design.

Next step in design evolution called for stamping the pocket segments from sheet steel. This improved life and reduced manufacturing costs somewhat. Assembly costs continued as a major cost factor, however.

Field reports arrived at this point to confirm the functional soundness of the wheel design. Immediate investigation began to produce a one-piece stamped wheel, thought by AMF engineers to offer the greatest potential in slashing manufacturing costs.



PUNCH INSERT (weight 1½ tons) stamps wheel to final contours. Surface needs no finishing.

An appropriate design was derived, practicable from tooling, production and performance standpoints. The desired and necessary lower cost per unit was attained with this design. A better performing part also resulted.

A basic stamping is shaped from a sheet metal blank to include both the cone and the curved wheel rim. Pockets also are rough-formed in this operation.

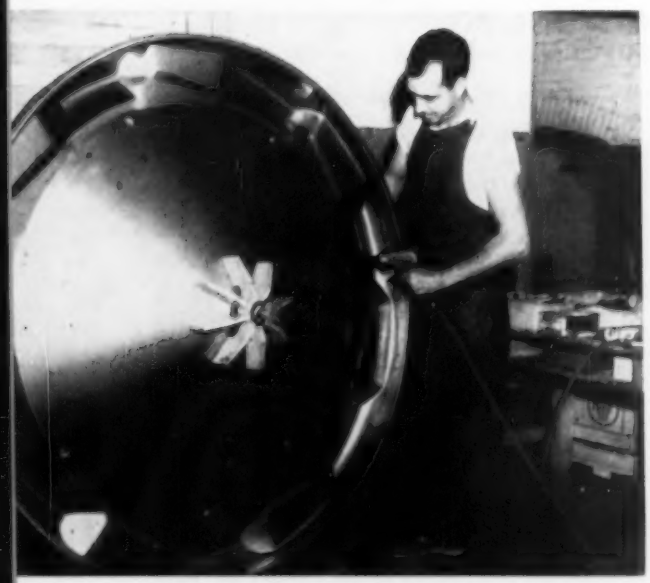
Mounting holes are pierced in the center of the wheel in a second operation. These holes serve as guides in subsequent piercing operations.

Drawn to shape on restrike

Pockets are drawn to exact shape on a restrike. Holes also are pierced in the cone of the blank during restrike to permit accurate location of the accessories with respect to the pocket segments. At the same time, other mounting holes are pierced in the periphery of the wheel.

After the drawing, piercing and restriking operations are complete, the belt groove is formed in the wheel rim. Accessory parts are attached to the back of the disk.

A difficult and costly manufacturing problem on the automatic Pinspotter was solved with the stamped wheel. Evolutionary approach to the wheel design was possible only by close cooperation between AMF engineers and the stamper. Faulty liaison at any point probably would have increased costs beyond possible design savings.

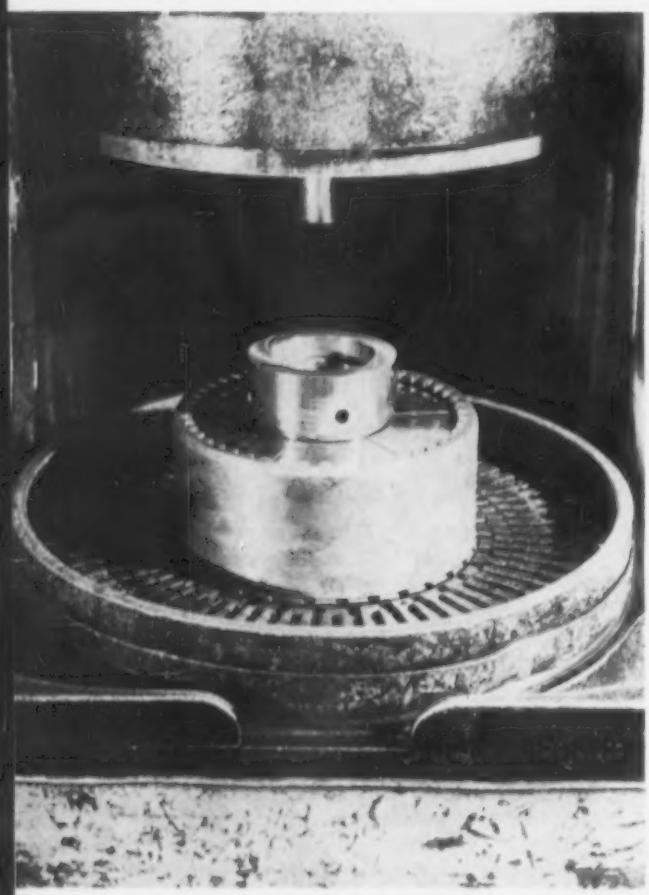


FIVE-FOOT diam wheel (including both cone and rim) is stamped in one piece from sheet steel.

On splined drums—

Simple Quenching Press Fixture Reduces Distortion

◆ DISTORTION due to quenching has been substantially reduced in an internally-splined clutch drum by use of a simple fixture. Drum rejections attributable to warpage during the hardening operation have been nearly eliminated. Quality of the hardened drum has been improved. Work now may be held easily within the close dimensional limits specified.



QUENCHING PRESS fixture eliminates truing operations on splined drum after hardening.

The distortion problem previously called for use of a quenching press. The press alone adequately corrected most furnace-induced distortion. But the hardening treatment caused warping of the internal splines, already cut in a prior operation.

The fixture is mounted in a Gleason quenching press. It utilizes a segmented die expanded by two tapered cones as the press ram descends. At the lower end of the press stroke, the outside diameter of the die has been expanded to grip the drum surfaces firmly.

The upper cone expands its segments against the internal splines of the drum. A spacer separating upper from lower cone transmits ram pressure, which expands the lower six segments against a piston bore of the clutch drum.

The six segments of the die are held by two tension springs which ride below the die surface in machined grooves.

Pressure expands segments

Two flat serrated plates clamp the upper and lower faces of the clutch drum as the segments expand under ram pressure. The lower plate is secured to the quench press bed. The upper is carried on the ram. On the upper plate is mounted a centering spindle which facilitates even application of pressure.

Immediately after clamping, flow of the quench liquid is initiated. The serrated plates tend to confine the coolant sufficiently to assure even quenching of drum splines. A 45° bevel on the upper cone forms a passage at the base of the drum splines which carries coolant completely around the drum.

The fixture is in use at the Transmission Division of Clark Equipment Co., Jackson, Mich. It has made possible finish grinding of the drum face and inside diameter of the piston bore without intervening operations for correction of distortion.



From the collection of Lewis Winant, New Jersey Arms Collectors Club. Maker: Le Conte, Paris, France, 1758-1763. An 11-by-14 inch print of this illustration with part and lettering omitted is available free on request on company letterhead.



In producing this cam of sintered iron powder, Bound Brook competed directly with other forms of metal fabrication — and emerged victorious. Bound Brook's knowledge and experience with powder metallurgy combined the plus values of uniform density, consistent dimensional accuracy, good surface finish and high speed production to create a superior part at moderate cost. Whenever you are challenged with a metal-fabrication problem which is not easily solved by conventional metal-working methods why not call in your Bound Brook Man? There's no obligation for inquiring—and, in conjunction with your engineers, he could produce a winner!

9

BOUND BROOK

BOUND BROOK OIL-LESS BEARING CO., EST. 1883, BOUND BROOK, N. J.

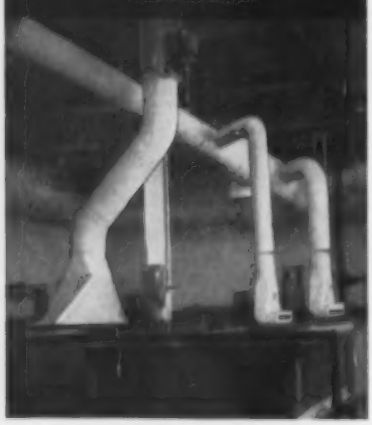
Pioneer in

POWDER METALLURGY BEARINGS + PARTS



FROM RAINCAP TO HOOD

Specify **PLA-TANK®** **for your DUCT SYSTEM**



Illustrated above is part of a new PLA-TANK Duct System which is typical of dozens being installed for fume exhausts in plating rooms, maintenance shops and chemical processing plants. PLA-TANK was chosen for the entire system from hoods to raincaps on the outside stacks.

Included in the system (in addition to hoods, ducts, stacks and caps) are molded PLA-TANK fan housings and propeller-type fan blades. *Everything that contacts the fumes is molded of chemical-resistant PLA-TANK.*

PLA-TANK, molded from long-life, resin-bonded glass fibre laminate is resistant to a wide variety of fumes and temperatures. It is lightweight, easy to install, competitively priced.

PLA-TANK can be the answer to your duct system problem. Let us help you the modern way — with PLA-TANK.

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THE Chemical CORPORATION

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FREE AIDS

New Technical Literature:

Automation

"Developments in Numerical Control," is the title of a folder explaining how data—such as dimensions, speeds and feeds—may be fed into a machine and translated directly into mechanical action. Included in the folder is discussion on the advantages of numerical control, its current development and an explanation of its application to a jig borer. *Pratt & Whitney, Div. of Niles-Bement-Pond Co.*

For free copy circle No. 1 on postcard, p. 157

Coatings

A 4-page folder discusses maintenance coatings for buildings and equipment, structural steel, towers and columns, tanks and piping, as well as coatings for tank linings. Covered are the four basic maintenance coating systems for a wide range of typical industrial corrosion problems caused by splash, spray and spillage of chemicals and by severe weathering. Properties and typical uses of the company's tank linings are also included. *Amercoat Corp.*

For free copy circle No. 2 on postcard, p. 157

Controllers

Specification Sheet 866 describes a line of remote bulb temperature controllers to detect and correct for temperature changes. The bulb sensing element can be inserted vertically or horizontally in pipes, tanks or other vessels. Types of bulb fittings and general specifications are included. *Minneapolis-Honeywell Regulator Co.*

For free copy circle No. 3 on postcard, p. 157

Tools

A brochure has been issued on a company line of screws, nuts, screw heads, screw drivers, wrenches and finishing washers. Twenty-one different tools are illustrated together with a listing of the various sizes that fit makes of drivers, wrenches and drive adapters. *Bergander Mfg. Co.*

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FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 157.

Cleaning

The application of specially designed airless blast equipment to 56 production cleaning problems, such as those encountered with cast, welded, forged, heat treated, and machined components used in automotive, railroad, ordnance, and all sorts of other equipment and machinery is fully described in a new 34-page brochure just published. This illustrated booklet includes the following other categories of cleaning and finishing in its collection: descaling of hot rolled steel strip, sheet, slabs, billets, and structural steel; etching steel mill rolls; cleaning tubing, soil pipe, steel drums, sanitary ware, and many other items. The shot peening process is also treated. The problems are taken from practically every major industry in the metals and metal-working field. *Wheelabrator Corp.*

For free copy circle No. 5 on postcard, p. 157

Ball bearing screws

A 32-page ball bearing screw and ball bearing spline catalog has been compiled. The catalog contains information on machine-ground ball bearing screws, rolled-thread ball bearing screws and ball bearing splines. The ball bearing screw was first used in the steering mechanisms of passenger cars, trucks and buses. A relatively new development, the ball bearing spline represents an advance in the application of ball bearings. *Saginaw Steering Gear Div., General Motors Corp.*

For free copy circle No. 6 on postcard, p. 157

Auto engine line

A 12-page brochure describing step-by-step processing of V-8 automobile engine blocks by automation methods is now being distributed. The new booklet covers operations of units installed in the automated engine production line recently opened by Plymouth Division, Chrysler Corporation. The text provides a running description of the operations that occur in sequence along dual six-hundred foot sections of the engine line. They include: semifinish boring of the cylinders and chamfering the tops and bottoms of the bores; boring, chamfering and finish-reaming of the tappet holes; broaching of main bearing lock slots; tightening main bearing cap bolts; line boring crankshaft and camshaft bores; milling oil slinger grooves in blocks; boring dowel holes, distributor and oil pump shaft holes; milling the oil pump pad; finish milling rear face of the block; finish milling right and left cylinder tops; and honing the cylinder bores. Pictures of the line appear in strips along the bottoms of the booklet pages, each strip being a continuation of that shown on the page before. *Ex-Cell-O Corp.*

For free copy circle No. 7 on postcard, p. 157

Partitions

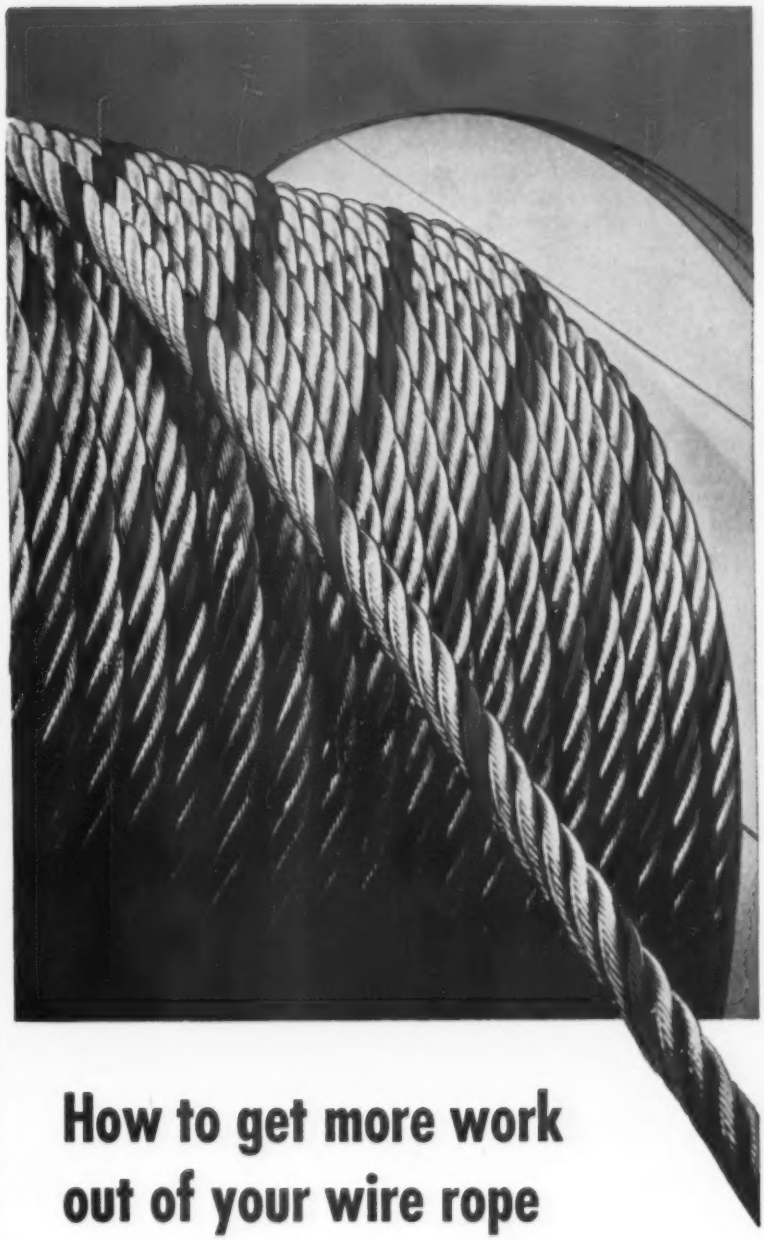
Partitions designed to meet the need for low-cost walls that can be moved or removed at any time in factories, warehouses and offices are described in a new catalog. Sections of the book discuss: features of the partitions, their assembly, paneling materials, and use in typical installations. The various types of partitions available with their dimensions are also included. *The Unistrut Co.*

For free copy circle No. 8 on postcard, p. 157

Process unit doors

Quick opening doors for processing equipment are the subject of a new 8-page bulletin. Automatic or semiautomatic in operation, these units are available in ring-lok and wedg-lok types. They are recommended by the manufacturer for vulcanizers, devulcanizers, impregnators, sterilizers, cement block curing vessels, ovens and creosoting cylinders. *Struthers Wells Corp.*

For free copy circle No. 9 on postcard, p. 157



How to get more work out of your wire rope

Get *higher-than-rated quality.*
Get *longer-than-expected service.*
Use Hercules Red-Strand.
It costs no more.

LESCHEN
HKP HERCULES Red-Strand® WIRE ROPE

from leading distributors

LESCHEN
WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.
St. Louis 12, Missouri



You wouldn't know they're safety spectacles until they're needed!

NOW—WILLSON DESIGN provides this *new concept* of style combined with protection—ideal for day-long wear!

You'll see a dramatic difference in this protective eyewear that's styled for greatest worker acceptance! New *wide-vision* lenses. New popular plastic frame styles. New designs that add distinctiveness to safety spectacles at last!

Workers will wear them willingly—with the Willson "Super-Tough" lenses prescription ground, if desired—because these new styles are as handsome as frames can be!

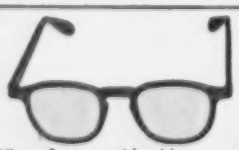
A full range of eye, bridge and temple sizes have been developed into attractive eyewear by the Willson Research Center. Ask your Willson distributor to show you the WF line soon.



Style WF
new wide-vision frame shape in flesh-color butyrate; spatula or half plastic-half cable temples



Style WFD
demi-amber wide-vision butyrate frame; matching spatula temples



Style WFB
popular Willson Bronze, wide-vision frame; spatula or half plastic-half cable temples



Style WFH
wide vision lenses, spatula temples—in new half-frame design (demi-amber overlay on upper half of crystal butyrate frame)

Over 300 safety products carry this world-famous trademark

WILLSON PRODUCTS, INC.
231 Washington Street, Reading, Pennsylvania

FREE TECHNICAL LITERATURE

Machining guide

A quick reference pocket guide to better use of Talide metal is being offered. Produced on a sturdy piece of laminated plastic, the guide presents recommended grades, type of cut and cutting speeds of Talide metal for machining various materials, from cast gray iron to plastics, asbestos, fibre, rubber, glass and mica. In addition, there is a chart indicating the rake and relief angles for Talide metal turning tools as applied to various materials. On the reverse side, a chart shows the suggested speeds, feeds and depths of cut for machining steel with Talide metal turning tools. Chip removal applications, wear applications and impact applications of Talide metal are also presented in chart form. *Metal Carbides Corp.*

For free copy circle No. 10 on postcard, p. 157

Rayotube detectors

A full description of a line of Rayotube (heat-radiation) detectors, for continuous temperature measurement to 5000°F and beyond, is available in a 24-page illustrated catalog just published. This publication discusses the theory behind heat - radiation measurements of actual surface temperatures and furnace atmospheres, describes Rayotube construction, and tabulates the characteristics of the detectors available. It lists complete assemblies for both general and specialized applications, and with exploded views shows the components of Rayotube assemblies. *Leeds & Northrup Co.*

For free copy circle No. 11 on postcard, p. 157

Drill-tapper

The operating features, construction and capacity of a new multi-spindle drill-tapper are described in a 4-page folder. Designed to provide a highly flexible, yet accurate and efficient machine for multiple-hole drilling and tapping, the unit drills eight No. 25 holes in mild steel or taps eight No. 10-32 holes in mild steel. Work pattern for the drill-tapper and its specifications are included. *The Cleveland Tapping Machine Co.*

For free copy circle No. 12 on postcard, p. 157

INDUSTRY GEARS FOR HIGHER PRODUCTIVE STANDARDS



why does PARKVIEW choose CLEARING O.B.I.'s?

ask C.P.C.*

When you talk about a tough, competitive business, the contract stamping plant stands out as a good example. Parkview Metal Products in Chicago is one of these. They manufacture all kinds of stampings, mainly for the electrical and electronic industries.

Companies like this, that have to stay on their toes production-wise, put a lot of emphasis on reliability of productive equipment. It's their bread and butter. Parkview has gone all out for Clearing O.B.I.'s because they can rely on them to meet their tight schedules. The versatility of their Clearings — the way they take extra-large dies and the way they can be adapted to automatic feeding — matches the ruggedness of their all-steel frames and the precision of their construction.

If you manufacture stampings, large or small, *Clearing Productivity Consultants can suggest ways to step up your production. Just call or write Clearing Machine Corporation. There'll be no obligation.

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION *DIVISION OF* **U. S. INDUSTRIES, INC.**

6499 WEST 65TH STREET, CHICAGO 38, ILLINOIS • HAMILTON PLANT, HAMILTON, OHIO

HAIR RAISING STORY

[or why it pays to use KEOKUK Silvery Pig]



Chief Keokuk:
"Ugh, me tell Little Chief how injun takes scalp. Him say modern injun get scalp by mail order!"

Princess Wenatchee:
"As usual, Junior does it the easy way!"

Here's one time when the easy way is the best way! Use the Keokuk form of silicon introduction . . . use *Silvery Pig Iron* You'll get the same high results every time in quality and uniformity. Remember, Keokuk Silvery holds your silicon losses to a minimum . . . and it can be handled by either magnet or count. Try Keokuk Silvery Pig!



KEOKUK ELECTRO-METALS COMPANY
KEOKUK, IOWA
Wenatchee Division, Wenatchee, Washington

SALES AGENT: MILLER AND COMPANY
332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

Keokuk Silvery . . . the superior form of silicon introduction . . . available in 60 and 30 pound pigs and 12½ pound piglets...in regular or alloy analysis. Keokuk also manufactures high silicon metal.

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on page 152

Instruments

"A Convenient Guide to Instruments, Controls and Control Systems for Improving Automatic Operation," is the title of a new 20-page condensed catalog. Sections are included on the company's products such as differential transformer systems, automatic control systems, time controls, motorized controls, motorized valves, valves, counters and electronic contactor. *Automatic Temperature Control Co.*

For free copy circle No. 13 on postcard

Oil valves

Characteristics and ordering data for a company line of oil valves are covered in Bulletin 0-5. Valves discussed are 1500 psi units for standard or tandem mounting; 3000 psi, 4 way standard, manifold porting, and tandem mounting valves; 6000 psi, 4-way standard units; 3000 psi manipulator standards; and shut-off valves (standard) for 1500 psi, 3000 psi and 6000 psi. *Barksdale Valves.*

For free copy circle No. 14 on postcard

Company profile

A 50-page illustrated brochure is given over to a discussion of "who we are, how we work, and what we produce," by a German manufacturer. Detailed are company facilities for testing materials, education of apprentices and foundry operations. Products produced by the company include compressors, expansion turbines, valves, pneumatic tools, condensing units, absorption machines, refrigerators and cooling cabinets. *Maschinenfabrik Surth.*

For free copy circle No. 15 on postcard

Die castings

Step-by-step explanation of company facilities for production of aluminum and magnesium sand, permanent mold and die castings. Discussion also on potentials of permanent mold casting and die casting, choosing the proper casting method and design, the al-fin process, magnesium and its alloys, aluminum and its alloys, with tables on the latter two items. *Rolle Mfg. Co.*

For free copy circle No. 16 on postcard

Vises, work holders

A new catalog contains descriptions of an entire line of work-holding tools. It includes detailed information on vises for angle machining, adjustable lathe fixtures for increasing the usefulness of lathes and turret lathes, safety work-holders for drill presses and many other special and standard work-holding devices for the metal working industry. *Universal Vise and Tool Co.*

For free copy circle No. 17 on postcard

Foundry alloys

A new brochure covering Vancoram alloys for the iron foundry has been issued. The publication lists the composition of principal Vancoram alloys used by iron foundries, and presents a clear concise analysis of their recommended uses. Other material included in the brochure is shipping information on Vancoram products, information about color-coding product containers, and the company's technical service facilities available to the industry. *Vanadium Corp. of America.*

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THE IRON AGE

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Village Station

NEW YORK 14, N. Y.

Industrial opportunity

The story of the industrial potential of the Utah, Idaho, Colorado and Wyoming area. Discussed are the area's mineral deposits, raw chemicals, steel industry development, available fuel, water and electricity, as well as the area's economic climate, labor supply and transportation facilities. *Utah Power & Light Co.*

For free copy circle No. 19 on postcard

Tantalum

Technical Data Bulletin 2.706 discusses the resistance of tantalum to corrosion by sulfuric acid in all concentrations. Given also are the corrosion rates of tantalum in 98 pct concentration of H_2SO_4 and the corrosion rates of tantalum in fuming H_2SO_4. *Fansteel Metallurgical Corp.*

For free copy circle No. 20 on postcard

Floor trucks

A 12-page catalog describes and pictures a company line of two wheel trucks, dolly trucks, wagon trucks, bar handle trucks, stake and rack trucks, shelf and enclosed trucks. Specifications are given for styles and models in each group. Sections of the catalog are devoted to wheel and caster assemblies. *Nutting Truck and Caster Co.*

For free copy circle No. 21 on postcard

Disk grinder

A new 8-page, 2 color-catalog illustrates and describes a precision double disk grinder. The catalog, identified by the number 2V-55, was written for production men interested in a precision grinder designed to generate parallel and flat surfaces on a variety of small parts. *Gardner Machine Co.*

For free copy circle No. 22 on postcard

Brushes

A new products bulletin describes the company's latest developments in brushing tools for cleaning, finishing, removing burrs, sweeping and painting. Specifications are given for various model brushes in the product line. *The Osborn Mfg. Co.*

For free copy circle No. 23 on postcard

FOR MORE LITERATURE
Many companies offer free literature and other information in their advertisements. For the names of these firms see the company listings in the Index of advertisers.

Oiler

Literature is available describing a portable hand pump for refilling all types of oil cups quickly and conveniently, directly from a gallon or larger container through a light flexible hose. Bulletin 44 discusses and pictures the use of this unit for dispensing oil to bearings, cutting tools, conveyor and drive chains, gears, pipe threading operations and spindle bearings on textile machinery. Applications are illustrated. *Trico Fuse Mfg. Co.*

For free copy circle No. 24 on postcard

Milling machine

Literature is available on a new bed-type production milling machine. It describes the unit's spindle motor which operates at 25 hp at 1800 rpm with spindle speeds from 25 to 1230 rpm being obtained through change gears, with four speeds per set. Discussed also is the table feed of 1 in. to 81 in. per minute through change gears and rapid traverse of table is 243 in. per minute. *Motch & Merryweather Machinery Co.*

For free copy circle No. 25 on postcard

Silicone compounds

Six new organo-silicone compounds with unusual lubricating and solubility are described in an 8-page data sheet. Reported to possess many properties hitherto not available in the silicones, they are expected to find broad industrial uses as special lubricants and as emulsifying agents or emulsion breakers. Suggested uses are as machine lubricants, metal lubricants, special high temperature lubricants with graphite, hot forming or packaging machine lubricants, greases, and for hydraulic applications. *Linde Air Products Co.*

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THE IRON AGE
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NEW YORK 14, N. Y.

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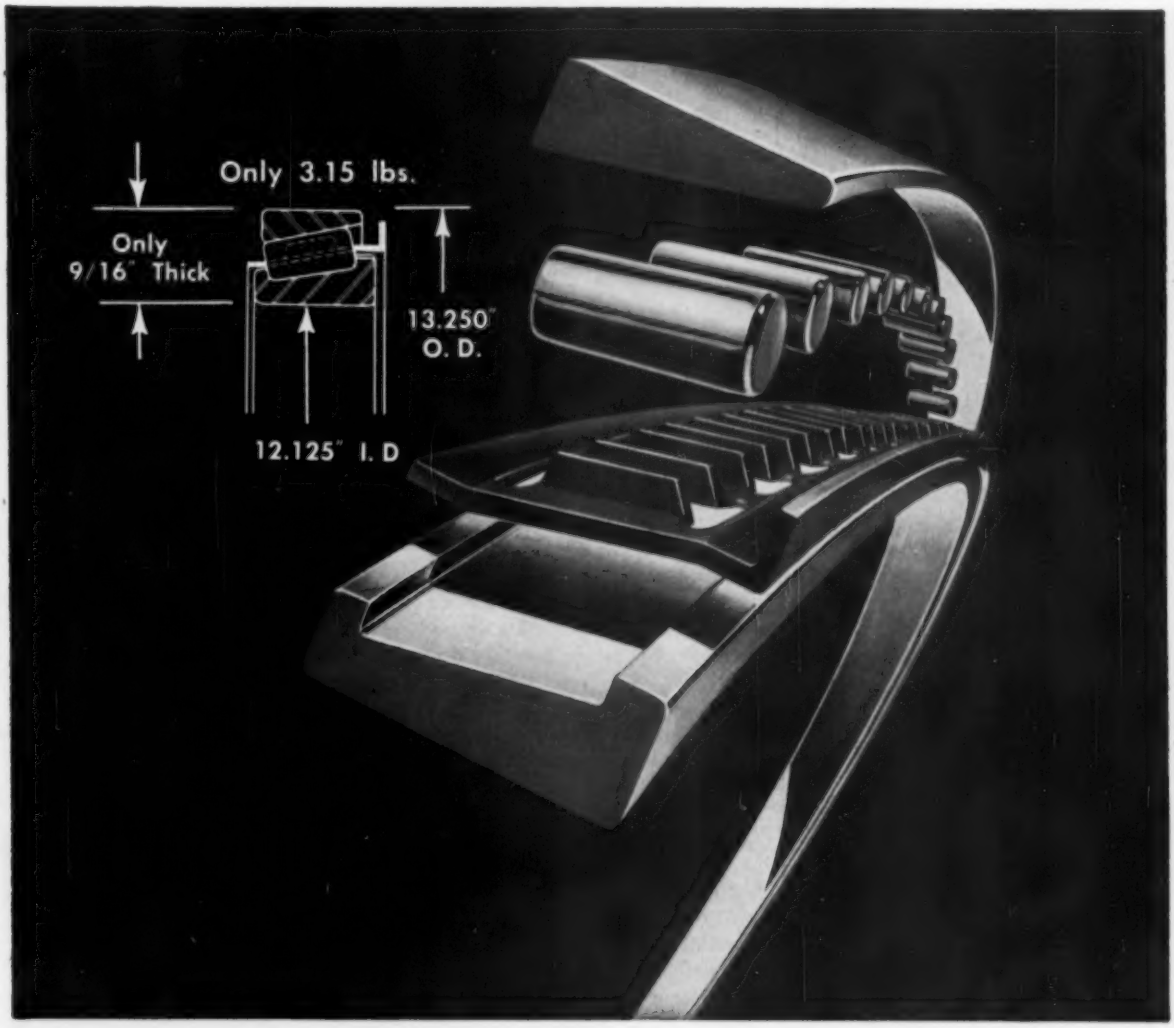
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Kaydon...
world's thinnest tapered roller bearings

Reali-Slim — that's the name we've given our line of extremely thin-section, lightweight bearings. The bearing shown above is a *Reali-Slim*. *Reali-Slim* bearings are really strong, too! The single row, tapered roller bearing we're talking about, here, has a 33,000-lb. radial capacity—with 38,200-lb. thrust capacity. Over 1-ft. in diameter, yet it weighs only 3.15 lbs! These figures tell how *Reali-Slim* bearings combine minimum section with high strength and long life.

If you're looking for a whole new concept in thin-section, lightweight bearing design — look at Kaydon's *Reali-Slim* line. In addition to hundreds of *Reali-Slim* standard sizes, there's a big variety of special races and separators to meet special applications. Kaydon engineers are prepared to give you valuable help with your application problems.

For more information write Kaydon of Muskegon. Ask for engineering Catalog No. 54RS-1 detailing:

★ ***Reali-Slim Ball Bearings*** — in Conrad, angular contact and 4-point contact types are available in seven standard cross sections from ¼" to 1.000" and in bore diameters from 4" to 40.000".

★ ***Reali-Slim Roller Bearings*** — in radial and taper roller types are available in cross sections from 9/16" and in bore diameters from 5" to 40.000".



K-552

THE KAYDON ENGINEERING CORP.

MUSKEGON • MICHIGAN

All types of ball and roller bearings — 4" to 120" outside diameter . . .

Taper Roller • Roller Thrust • Roller Radial • Bi-Angular Roller • Spherical Roller • Ball Radial • Ball Thrust Bearings.

MORE RIGID

...yet it costs less to make from welded steel

THIS base for a precision drilling machine shows what benefits can be realized by proper design for welded steel.

40% less material is now used . . . yet the design is considerably more rigid. Alignment tolerances of .017" on the original base are held to .002" in the welded design.

The cost is considerably lower than the original cast construction.



Fig. 1. Welded Steel Base *for Wales-Strippit Company, N. Tonawanda, N. Y. Designed using the Lincoln WELDesign System.*

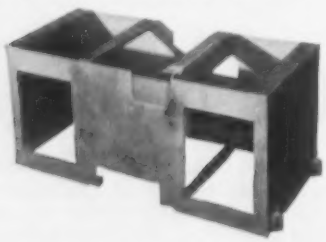


Fig. 2. Former Design *had cast sections that were shipped in parts and aligned in customer's shop.*

Savings like these can be duplicated on your products. Have a Lincoln representative show you how to benefit. Write.

THE LINCOLN ELECTRIC COMPANY

Dept. 1512 • Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

FORMING: Flow Turning Parts

Using cold forming, an aircraft firm cuts machining time, betters product, saves substantially on scrap . . . Technique is now routine.

Flow turning—the cold flowing of metal to a specific shape over a hardened arbor—has developed from an impossibility to a routine operation at Ford Aircraft Engine Div., Chicago. The Division currently is producing the J-57 turbojet engine, which is officially rated at 10,000 lb thrust.

The revolutionary process of flow turning is becoming increasingly important in the machining of critical jet engine parts. Developed from the century-old metal craft of spinning, the process was introduced only a few short years ago.

'Impossible' Achieved

As an example, information from the machine manufacturer and other companies using the machines indicated that it was impossible to flow-turn the J-57 compressor chamber rear liner or "bullet nose" as it is commonly known.

That, however, was before engineers of the Division's Semi-Production Department tackled the problem and developed a contour attachment which resulted in a perfect piece part in one operation. This innovation—combined with additional designs of blanks, arbors and rollers—has resulted in substantial scrap reduction, a 40 pct reduction in machining time and a finished product of higher quality.

Other Parts Flow-Turned

Three other parts currently are being flow-turned. In one operation, a finished rear bearing support is completed in less than two minutes. Furthermore, schedules call for the flow-turning of an additional 23 parts in the coming year. Tooling costs have been drastically reduced and results have been uniform. Many conical parts, previously considered impossible to press with conventional dies because of metal fractures, have been successfully flow-turned by Semi-Production.

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 157. Just indicate the page on which it appears. Be sure to note exactly the information wanted.



Operator prepares to flow-turn rear bearing support blank.

Fabrication:

Tanks are site joined by submerged arc welding.

All-welded tanks—developed for compressed air storage facilities for a supersonic wind tunnel—have dished tops and bottoms site welded with the automatic submerged arc process. These tank assemblies were mounted on a large jig which rotated the seams under a head provided by the Lincoln Electric Co., Cleveland. The head was carried on a self-propelled tractor which rode directly

on the assembly, with tractor speed and rotation of the assembly synchronized to result in a welding speed of approx. 8/10 ft per minute. Size of the plate was 1 3/16 in.



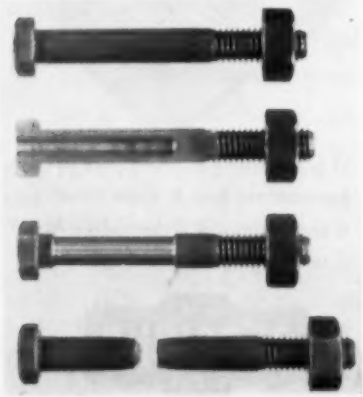
Air storage tanks are site joined by submerged arc process.

The tanks—each of which will hold 291,000 gal of air, compressed to 132 psi—were constructed for the North American Aviation Co. by the Pittsburgh-Des Moines Steel Co.

Fastening:

Method increases strength of bolted joints.

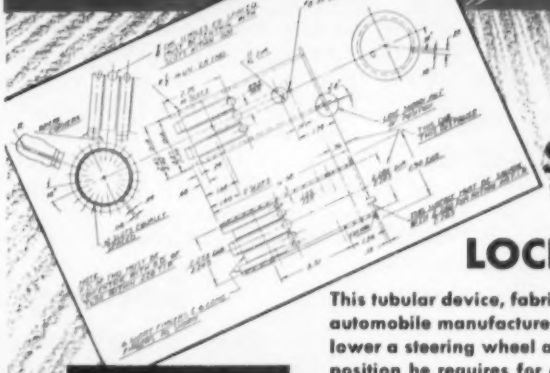
An unusual method for increasing the strength of bolted joints when subjected to shock loads involves the removal of a precise amount of material from the shank of the bolt, thus reducing the shank to certain optimum sizes depending on type of bolt, method of manufacture and heat treatment.



Impact strength is increased by removing shank material.

Michigan
Electric Resistance WELDED
STEEL TUBING
Always makes possible Better products at lower Cost





Automotive Steering Wheel
HEIGHT LOCKING DEVICE

This tubular device, fabricated by Michigan for a major automobile manufacturer, enables the driver to raise or lower a steering wheel and lock it into the exact elbow position he requires for greatest driving comfort.

A hand nut on the locking sleeve is turned counter-clockwise one-half and locked at the desired height by a one-half clockwise turn.

The utmost dimensional accuracy is required for this intricate part, which requires a multiplicity of exacting operations for smooth, reliable functioning. It is still another example of the ability of Michigan engineers and production workers to meet the needs of product manufacturers for difficult tubing fabrications produced in volume at low cost.

You are invited to check the dimensions in the drawing at the right. It illustrates the type of problems that our engineering staff is always prepared to solve for Michigan customers.

We will welcome the opportunity to place at your disposal the many years of design and production skills that make Michigan tubular products so superior, so dependable, so economical.

ROUND
⅛" to 4" O.D. 7 to 22 gauge

SQUARE	Gauge	RECTANGULAR
⅛" to ¾"	16 thru 22	
⅛" to 3"	11 thru 22	⅜" minimum side to 5" maximum side
1" to 2"	11 thru 20	
2" to 3"	11 thru 18	

Carbon 1010 to 1025

Michigan Tubing

has uniform strength, weight, ductility, I.D. and O.D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

RESISTANCE WELDED STEEL TUBING
Michigan STEEL TUBE PRODUCTS CO.
THE OLDEST NAME IN ELECTRIC
Nearly 40 Years in the Business
9450 BUFFALO ST. • DETROIT 12, MICH.
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

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Don't junk your old lathe just because it has begun to chatter and shake.

Now is the time to have your outdated machine tools returned to their original performance levels through Simmons Engineered Rebuilding—at half the cost of new equipment.



Engineered Rebuilding by Simmons *unconditionally guarantees* that your machine tools will equal or exceed manufacturers' original specifications.

And, through modernization, Simmons is adapting old machines to high-speed, high-precision production that was unheard of when the tools were new.

Today: look into the important economies in production, maintenance, and liberal tax allowances available when you turn the old machines in your plant into precision equipment for today's production!

Write, wire, or phone...

Simmons Machine Tool Corp.
1721 N. Broadway, Albany 1, N. Y.

Unconditional guarantee... our standard since 1910

Although bolts modified in this way weigh less than their original form, their capacity to absorb impact energy is several times greater than ordinary bolts. This property may prove valuable in the construction of combustion engines, railroad car carriages, rock crushers, and other machinery where parts are subject to sudden and repeated shock loads.

Nuts Hold Tighter

In addition to the remarkable increase in impact strength, the modified bolt with the reduced shank permits greater stretching or elongation during tightening. Consequently, the nut is less likely to loosen because of vibration. Also, resistance to fatigue failure is increased so that the bolt will last longer in rough service. The reduced weight and increased strength plus the vibration defying qualities of the modified bolt could prove valuable to the aircraft industries.

The research involved in developing these conclusions was carried on at the Mechanical Engineering Department and the Engineering Experiment Station of the University of Missouri.

Rolling:

Powered roller tables included in new bar mill.

Three specially-designed powered roller tables built and installed by E. W. Bliss Co., Salem, Ohio, are among the facilities of a new merchant bar products mill at Phoenix Mfg. Co., Joliet, Ill. The mill, with a monthly capacity of 12,000 ton, was planned to meet demand for merchant bar products by Phoenix, a manufacturer or horseshoes.

Operation Described

The first of these is a live table that carries hot billets from the furnace to a 3-high roughing mill. From this mill billets pass onto a tilting table, a hydraulic table with 7¼-ton concrete counter-balance weights. When the billet is broken down to size for intermediate and finishing processes, it

Electro MANGANESE 99.9+%

STANDARD OF THE WORLD FOR PURITY

Write for pamphlet

Electro MANGANESE CORPORATION
BOX 479 KNOXVILLE, TENNESSEE

STAMPINGS for the FINISHED PRODUCT



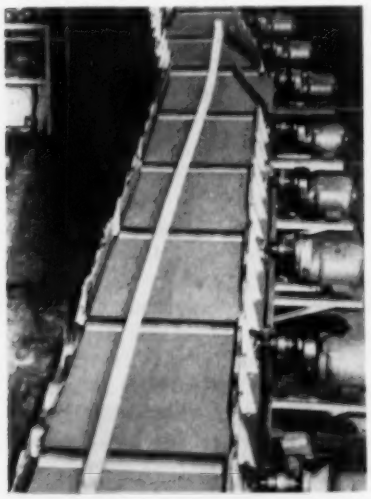
SEE SESSIONS . . . for Metal Specialties, Box & Case Hardware, Stamped Assemblies in a wide range of finishes.

J. H. SESSIONS & SON

290 RIVERSIDE AVENUE • BRISTOL, CONN.

passes from the tilting table to a two-section 120-ft runout table. To maintain the flow of steel to the mills, the table is designed for quick and easy maintenance. Both motors and rollers, for example, are arranged for fast removal and replacement.

The first section of the runout table, between tilt table and shear,



Runout table carries bar stock for horseshoe production.

handles billets from 30 ft to 70 ft in length and from 300 to 700 lb in weight. It is driven by eight rollers which are mounted on anti-friction pillow blocks and are directly connected to the motors. The next section of the runout table is powered by 16 driven rollers. Rollers in each section are driven by 2 hp 450 rpm non-reversing motors.

Handling:

Bridge crane freed by modified truck

Jones & Laughlin Steel Corp., Pittsburgh, has freed an expensive piece of handling equipment and reduced required manhours one-third in the operation of removing and replacing drive couplings (fish-tails) and bearing chocks (roll neck bearings) on rolls, before and after roll regrinding.

Rolls are removed from the stands by overhead crane and delivered to horizontal racks in the roll grinding department. There

Precision gears custom-made by Perkins

meet your specs ***and*** *your time-table*

Throughout industry, the name PERKINS in association with GEARS has long been symbolical with quality and service. Hence — be they washing machines or supersonic aircraft engines — if the component gears of the finished product are *custom-made by Perkins*, they will be *better* products. *You furnish the specifications, we'll produce the gears!*

PERKINS MAKES in all materials, metallic or non-metallic, and in any size, to your specifications: helical gears, bevel gears, sprockets, ratchets, worm gears, spur gears with shaved or ground teeth, ground thread worms.

NOTE: The **PERKINS PRECISION SPRING COILER** is the latest development in the spring coiler field and eliminates entirely the use of arbors and long set-up time. It is a complete self-sufficient machine and enables you to make the spring you want *when* you want it — in seconds. The coiler produces any type of spring, in any diameter and any pitch with this range: Wire Sizes .005 to .125. Diameter from 3/32" to 12" and larger. Size of the compact coiler is only 7½ x 16". **A POWER MODEL** mounted on a welded steel console cabinet base is also available. Full information on request.

Perkins Machine & Gear Co.

103 Circuit Ave., Springfield, Mass.



an ACCO product

The Chain that Identifies Itself—

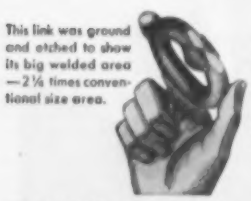


PATENT APPLIED FOR

ACCOLOY X-WELD 125 is available in 5 sizes

• The sensational new **Accoloy X-Weld 125** chain stands out distinctively and is a leader among quality chain. Its unique link formation, with the king-size welded area, identifies it instantly.

Welds with these alloy lugs are as strong or stronger than the alloy material. Kinking is prevented by the projecting lugs—chain hangs straight as a die!



Accoloy X-Weld 125 chains are available *now* in five sizes—¼", ⅜", ½", ⅝" and ¾". Use them for slings, towing, bundling, general utility jobs. Write our York, Pennsylvania, office for **Bulletin DH-319.**

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American Chain Division
AMERICAN CHAIN & CABLE

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Better Value

a crew removes bearings and chocks from a worn roll and replaces them on a reground roll, which is then ready for re-use. The worn roll minus its bearings is then delivered to the roll grinders.

75-ton Crane Used

Formerly, the job of removing the coupling and bearing was accomplished with the use of 75-ton bridge crane. Lifting eyes were screwed into the coupler and the housing of the bearing, the crane hook attached, and the crane moved so that the bearing would slip off.

In most cases, no problem resulted, but periodically a bearing would stick, making the job of removal both dangerous and time consuming. When this happened, it was necessary to get a running start with the crane and attempt to jerk the chock loose. If the chock refused to slip off, the momentum of the crane would frequently pull the entire roll out of the rack, slewing it across the floor. And even when the bearing did come free, it would swing dangerously, pendulum fashion.

Industrial Truck Adapted

In addition to the handling problem, the operation tied up the crane when it was badly needed for production activities.

It was decided to adapt a standard industrial truck to do the job. The truck's original mechanical lifting arrangement was removed and a complete hydraulic system with individual pump and motor installed to provide power for the various required movements.

In principle, the converted Elwell-Parker truck operates much like a gear or wheel puller. A pair of arms which are hydraulically raised or lowered reach over the chock and are used to pull it off. A hydraulic ram located between the uprights engages the end of the roll shaft. By pushing against the shaft with the ram, the chock can be easily slipped off with the pull-off arms.

A standard electric powered winch unit with integral motor

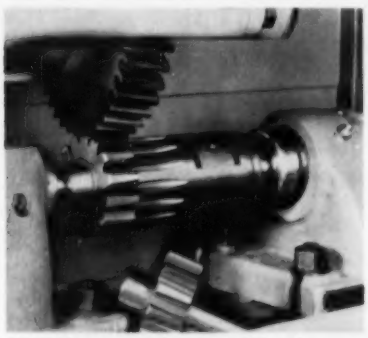
powers a cable hook which runs over a stationary boom attached to the top of the uprights. The boom and hook are used to support the drive coupling and bearing chocks when they are free of the roll shaft.

Machining:

Conical helical cutter shaves steering gear teeth.

A process for shaving conical involute gears is being applied to shaving teeth on steering gear segments in automotive power steering mechanism.

The process, developed by National Broach & Machine Co., makes use of a special patented conical helical shaving cutter and can be performed on standard Red Ring diagonal rotary gear shaving machines. It produces a gear that meets rigid engineering specifications for surface finish, size, and accuracy of tooth taper.



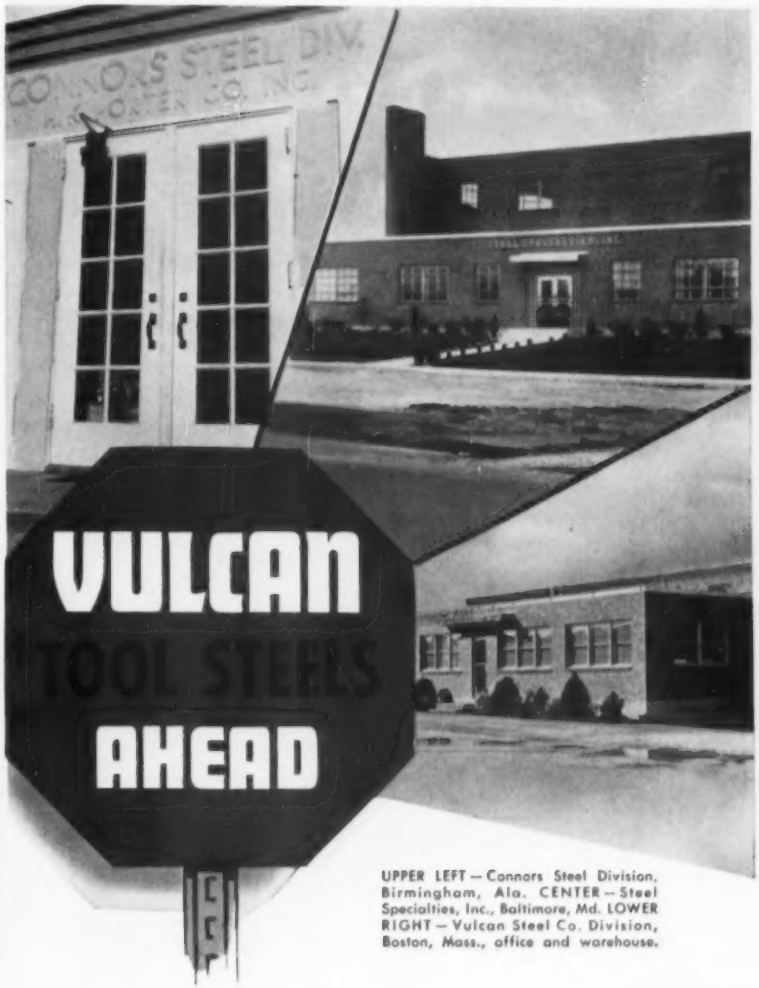
Steering gear segment in shaver. Note tapered cutter teeth.

Steering gears shaved by the new process maintain initial backlash settings and operate smoothly at all steering positions.

How It Works

The steering gear segment to be shaved is mounted in an arbor assembly having steel dummy teeth which complete the tooth circumference of the gear segment. The segment is located in correct axial location in the work arbor and dummy gear assembly by clamping the gear against the face from which it was generated in the previous gear tooth roughing operation.

The gear and arbor unit are



UPPER LEFT — Connors Steel Division, Birmingham, Ala. CENTER — Steel Specialties, Inc., Baltimore, Md. LOWER RIGHT — Vulcan Steel Co. Division, Boston, Mass., office and warehouse.

improving service to you

Additional sales and distribution outlets—in key areas—mean VULCAN Tool Steels are *directly* ahead of you.

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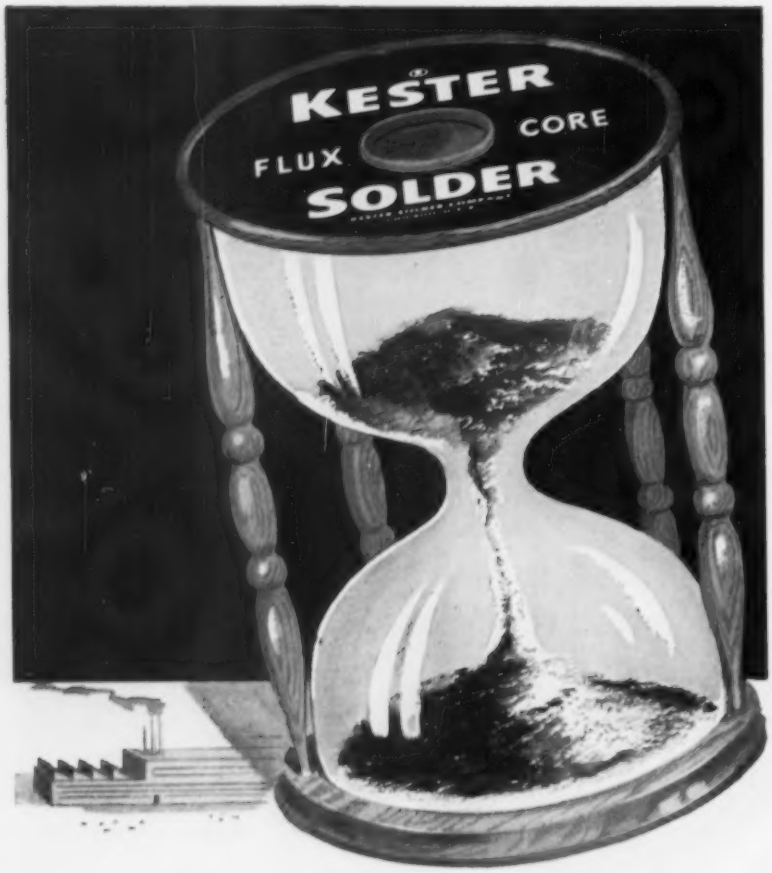
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"Machine shaves gear by the diagonal method . . ."

then mounted between centers in mesh with the cutter on a standard rotary gear shaving machine set up to shave the gear by the well-known diagonal method. The cutter and work gear centerlines are set at a slight crossed axis angle for the shaving operation.

Push Button Control

Operation of a pushbutton control on the shaving machine causes the work gear assembly to feed across the cutter on a diagonal path at 90° to the centerline of the cutter. The work gear feeds back across the cutter and the gear and arbor unit is removed, thus completing the shaving cycle.

Cycle time for the conical gear shaving operation, the maker reports, is at least as fast as for any other gear of similar size and tooth specifications produced by the diagonal shaving process. The process permits shaving operations to be performed in about half the time required by the conventional shaving method, in which the work gear is reciprocated parallel to the cutter axis while being fed to depth.

Removes 0.004-in. of Stock

About 0.004-in. of stock is removed from the conical involute gear tooth thickness during the shaving process. A typical power steering gear sector shaved by the new process has five, conical involute, tapered-teeth that mesh with a 5-diametral pitch rack having a normal pressure angle of about 20-degrees.

The special shaving cutter used to shave this gear by the new process has a 9-in. O.D. and is about 1⅜-in. wide.

Casting:

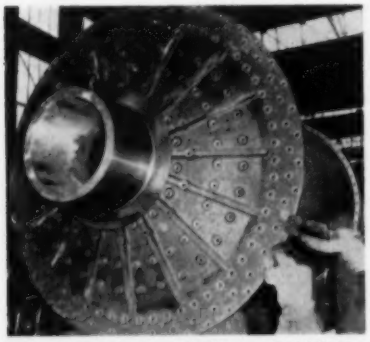
Units weighing 40,000 lb. made for grinding mill.

Steel castings weighing 40,000 lb each are used for the two heads and trunnions of a 11½ ft diam grinding mill. The many bosses reinforce the wall where bolts

support a lining to take the wear of grinding action in the mill. Nearly 250 bolt holes were bored through each casting.

Loads carried on these castings include the rotating mill, steel balls used in grinding, the charge of rock or other material to be broken, and the impact loads resulting from tumbling the charge.

The castings were produced by the Standard Steel Works Division (Burnham, Pa.), of Baldwin-Lima-Hamilton Corp. for Traylor Engineering and Manufacturing



Steel casting weighing 40,000 lb. for 11½ ft diam. grinding mill.

Co., Allentown, Pa. Severe service requirements are met by use of ASTM A-27-52T Grade 70-36 steel. Machining was done on a vertical boring machine with a 15 ft diam table.

Metals:

Better quality control of jet engine components.

National Bureau of Standards has developed a new approved chemical analysis of complex high-temperature alloys, such as those used in jet engines to obtain the desired combination of high heat resistance and low thermal expansion.

Quantitative analysis of these alloys now is practicable including detection of nickel, manganese, cobalt, and iron in the presence of niobium, molybdenum, tantalum, tungsten, silicon, and copper.

Composition of these alloys must be carefully controlled. Rapid spectrographic procedures supply this control if constituents

PRODUCTION COST

Cut 2/3

You Can Make a Similar Saving in Your Assembly Department!



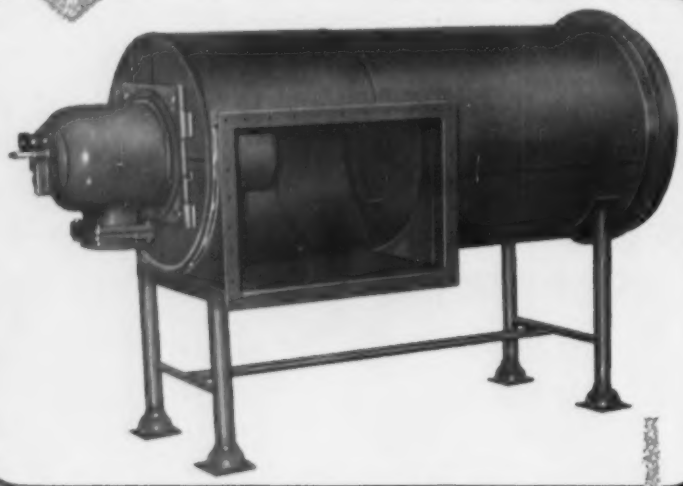
DPS POWER SCREWDRIVERS assembling automobile arm rests

● These two machines maintain a production rate in excess of that previously attained by six hand operations, effecting an immediate saving of 66⅔%. This versatile equipment, used in prominent plants everywhere, can be adapted to your individual needs—So, get more action in your Assembly Department now—more speed—more profit. Write us, give details and our trained engineers will work out the proper solution of your problem.

DETROIT POWER SCREWDRIVER CO.

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THERMAL TYPE CA
DIRECT FIRED AIR HEATERS



COMPACT . . . EASILY INSTALLED

Readily fitted to ovens, kilns, spray dryers, etc., the THERMAL Type CA Air Heater is an ideal source of heat where products of combustion may be mixed with the air. Oil, gas or combination firing is available without change in heater construction.

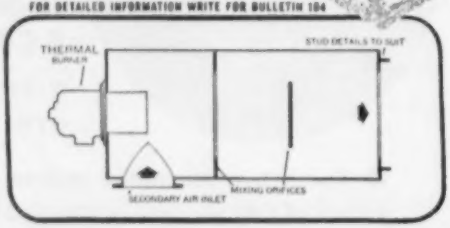
NO REFRACTORY REQUIRED . . .

The THERMAL High Velocity Burner built into the heater permits combustion to be substantially completed within the burner itself. Thus the heater is basically a mixing chamber wherein the products of combustion are mixed with the air being heated. Refractory is not normally used. Successful applications have been made ranging from under 200,000 BTU/hr. to over 20,000,000 BTU/hr. and at all pressure levels.

FOR DETAILED INFORMATION WRITE FOR BULLETIN 104

UNITIZED CONSTRUCTION

Initial cost and upkeep is kept at a minimum through the use of all welded, all metal construction. The CA Air Heaters are normally supplied as complete "package" installations.



OTHER THERMAL PRODUCTS & SERVICES — Gas, Oil & Combination Gas-Oil Burners • Heat Exchangers • Submerged Combustion • Combustion & Heat Transfer Engineering

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REPRESENTATIVES IN PRINCIPAL CITIES

have been carefully analyzed. However, high-temperature alloys contain elements whose chemical properties such as molybdenum, titanium, tungsten, and niobium make analytical separation difficult. In such mixtures, even the determination of nickel—ordinarily a simple matter—may become involved.

Ion Exchange Used

The procedure was designed particularly for analysis of an S-816 type of alloy containing 40 pct cobalt, 20 pct nickel, 20 pct chromium, and 4 pct each of niobium, tungsten, and molybdenum. The remainder of the alloy is largely iron, manganese, carbon, and silicon. An ion exchange method is used in which the differential retention of metal ions on the surfaces of certain resins is measured.

The first step in analysis is dissolving the alloy in aqua regia. A chloride solution is prepared of the elements which is transferred to an anion-exchange column.

Nickel and manganese, with chromium and some other elements, are collected in the first fraction. Cobalt is separated in a second fraction and iron in a third.

Cold Testing:

Winterized crane works at below zero

Army engineers have completed successfully field tests on a winterized 20 ton truck mounted crane at the Mesabi Iron Range in Northern Minnesota.

Equipped with winterization units developed by the Corps of Engineers Research and Development Laboratories, Fort Belvoir, Va., the truck-mounted crane operated efficiently in sub-zero temperatures for two months. It is designed to work in temperatures as low as —65°F. The crane uses special arctic lubricants, which prevent the mechanism from freezing in extremely cold weather.

The cab is enclosed for opera-

tor protection. Heating is accomplished by circulating heated coolant either from a gasoline-burning heater, or the engine through a cab-installed heat exchanger. Fresh air is provided through personnel heaters for ventilation and the removal of moisture from human breathing. By removing this moisture, the problem of window frosting is appreciably reduced.

A modified engine enclosure prevents the entry of wind-blown snow. Exhaust heater gases warm the battery and engine oil.

Both thermal and acoustical insulation reduce heat loss and the noise level. All rubber components are materials which remain flexible at —65°F.

The crane was shipped to Big Delta, Alaska, where more severe tests will be conducted during the coming winter.

Maintenance:

Good service record reported for wrought iron pipe

A recent survey of ice skating rinks in the National Hockey League indicates that those piped with wrought iron have an excellent service record despite the highly corrosive conditions to which the piping was subjected.

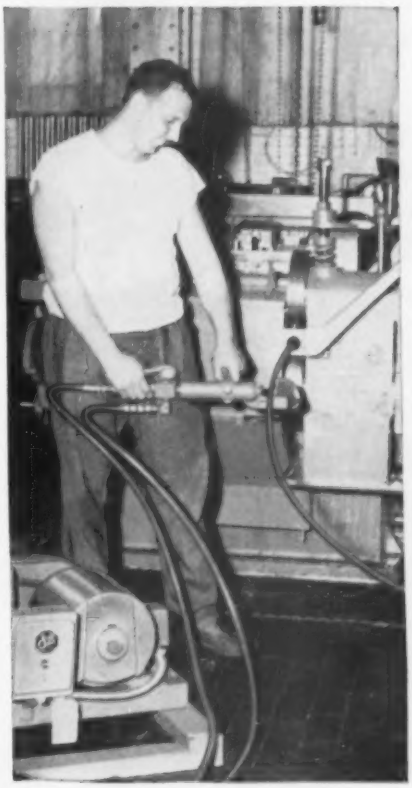


Madison Square Garden floor, laid in 1948, is still excellent.

Four of the six rinks used by the teams were found to be piped with wrought iron. They are those in New York, Chicago, Montreal and Toronto. The Boston rink is piped with extra heavy steel and the stadium in Detroit uses toncan pipe. Of the six rinks surveyed only the one in Detroit

MANCO GUILLOTINE

Hydraulic Rod Straightener



Fast, easy to use, the Manco Rod Straightener can be operated by hand valve as shown above or by foot valve if desired.

Straightens Ends of Coiled Rod For Insertion Into Drawing Dies or Cold Heading Machines

With the new Manco Guillotine Hydraulic Rod Straightener you can quickly and easily straighten the leading end of heavy coiled rod. It takes only 15 seconds to straighten a four foot length. Capacity for 9/16" to 1¼" diameter rod. Powerful hydraulic action develops 10 tons thrust. Unit is equipped with Manco 3 h.p. electric hydraulic pump. Weight of head, 18 lbs. Weight of pump unit, 300 lbs.



NEW MANCO GUILLOTINE CATALOG
also available on complete line of special hydraulic tools for cutting, shearing, punching, bending, riveting.



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Manco Mfg. Co., Bradley, Illinois
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☐ Bulletin on Rod Straightener
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PACE SETTER

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MEN AND MACHINES both produce faster when a Liftabout-Jr. carries the load! Manual lifting and lugging are banished . . . the worker puts the load right where it's wanted with ease. Ideal for "spot" handling or for speeding raw materials and products along your production line.

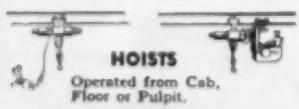
Shepard Niles Liftabout-Jr. is built to withstand years of use and abuse . . . it's the toughest medium-service hoist money can buy. Available with either rope or push button operation . . .parallel or cross-mounted with bolt, hook or trolley suspension in 250, 500, 1000 or 2000 lb. capacities.

Send for Hoist Bulletin today . . . and request a Shepard Niles representative to call. He'll give you the facts on the complete Liftabout-Jr. line . . . help you select the hoist with the right capacity and controls for your lifting job.

America's Most Complete Line of Cranes and Hoists since 1903



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Overhead: Top Running, Inner Running, Under Running, Floor or Cab Operated.



HOISTS
Operated from Cab, Floor or Pulpit.

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CRANE AND HOIST CORPORATION

1457 Schuyler Ave., Montour Falls, N.Y.

"At Toronto, not a single pipe failure since 1931 . . ."

has required piping replacements in 1955.

At Toronto's playing area not a single piping failure had been reported since the rink was originally constructed in 1931. The 13½ miles of corrosion-resistant piping used in the rink is of wrought iron construction.

Dates From 1948

Another interesting piping record was uncovered in New York City's famous Madison Square Garden. This rink was constructed in 1925 using 1¼-in. steel brine coils which were encased in a concrete floor. Three years later leaks developed in the piping, and by 1934 it was necessary to repipe the entire rink. Approximately 63,000 ft of wrought iron pipe was installed in the new floor.

In 1948 the Garden's management became concerned over cracks which had developed in the floor's surface due to the heavy traffic it had undergone over the years. They decided to resurface the floor and, since the piping was exposed, repipe the rink with wrought iron. The 14-year-old wrought iron piping, which was removed, was found to be in excellent condition, and it was resold for 80 pct of the cost of the new wrought iron pipe.

20 Years At Chicago

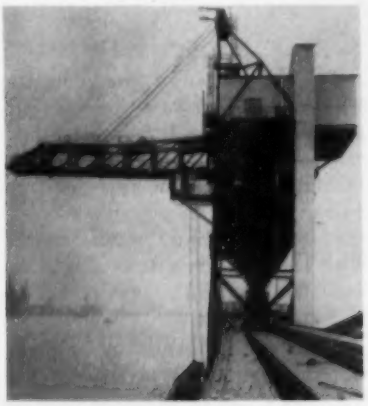
Only a treatment of the brine solution is on the maintenance schedule at Chicago Stadium. This rink, built in 1928, is piped through with wrought iron. The original piping in the rink was steel, but by 1935, the entire piping and floor had to be replaced before the rink was repiped with wrought iron. For the past 20 years, the piping has served without any important maintenance problems.

The survey is part of a regular check-up program conducted by the Engineering Service Department of A. M. Byers Co., Pittsburgh wrought iron producers.

Handling:

Unloading tower travels holding 850 tons.

A 136 ft high traveling unloading tower with a built-in elevator is being installed at the expanded Astoria station of The Consolidated Edison Company of New York. A 150 ton receiving hopper, enclosed on the top, sides and rear, is built into the tower.



Traveling unloading tower contains a 150 ton receiving hopper.

The tower is designed and built by the Mead-Morrison Division of The McKiernan-Terry Corp. It is equipped with lightweight grab bucket of 10 ton capacity and a free-digging rate of 850 tons per hour.

Of braced frame riveted construction, the tower straddles a 21 ft high conveyor structure and travels on a 240 ft runway. Variable voltage control is used. A liquid spray system suppresses coal dust in unloading.

Plastics:

Reduced tooling, less cost with plastic tools and dies.

By reducing number of tooling operations required, plastic tools and dies are creating savings as high as a quarter of a million dollars in a single phase of production by automotive concerns and other firms engaged in metal forming.

The Marblette Corp., Long Island City 1, N. Y., in a report on



THE DIES ARE YOURS FREE!

Yes, we do hundreds of stamping jobs without making special tools—and there's a good reason for this. In stamping out laminated shims for over forty years, we've developed much special equipment and tooling unknown in the average stampings house... including an arsenal of blanking dies and punches...and we've acquired unusual production techniques and skills. This equipment and these special skills are at your service without charge.

ROCK-BOTTOM PRICES . . . BY THREE METHODS!

These three separate production techniques are judiciously applied to save you money on your stamping needs!

MACHINE CUT METHOD. Regardless of quantity, we have the method that fits your needs best! For half-a-dozen or a few hundred stampings, our *Machine Cut Method* produces the stampings at amazingly low cost.

SHORT RUN METHOD. As quantities increase, we shift to the *Short Run Method*, with stock tooling and temporary dies—such as the surprisingly low-priced Hecht-type die.

PRODUCTION METHOD. Or we shift to our *Production Method* using high speed self-feeding presses.

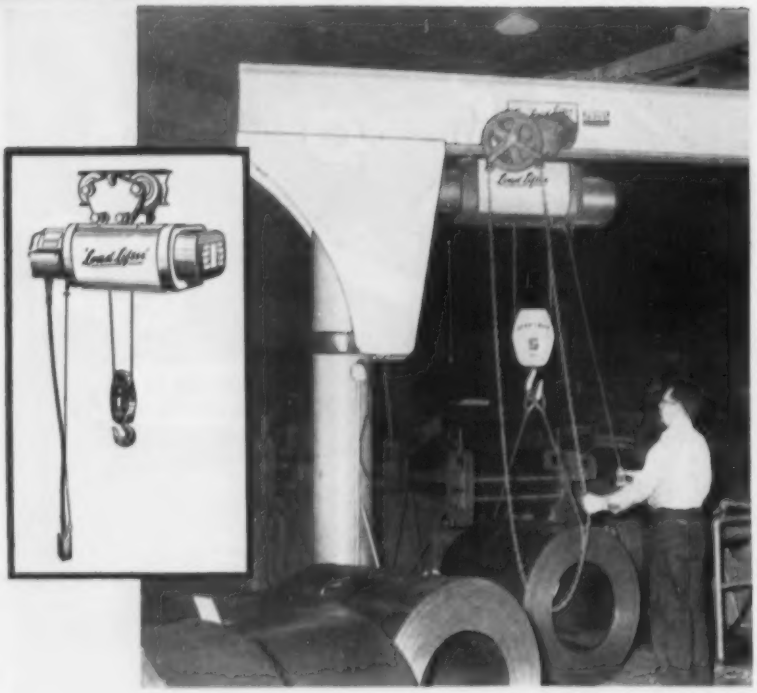
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STAMPINGS DIVISION

"ONE PIECE OR ONE MILLION"

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WANT LOWER COSTS? THEN USE THIS HOIST!

Step up load handling speed in your plant and save money doing it. Put the Series "700" 'Load Lifter' Electric Hoist to work. It shortens hoisting time—lifts a 1-ton load a foot in only 2 seconds! You get more lifts per hour.

The Series "700" 'Load Lifter' is a push-button work-saver, safety-engineered to protect man, load and hoist. Only 24 volts at the pendant control! The powerful load and motor brakes are synchronized; each alone can hold the full load. Steel suspension and overcapacity load hook, plus preformed nonrotating wire rope, provide super-strength.

The Series "700" 'Load Lifter' has few parts—trouble-free performance assured! There's extra durability in the heat-treated helical gearing; extra-smooth operation because ball bearings are used throughout. Capacities from ½ ton up. Single and two-speed control and all types of suspension available.

Let the nearby "Shaw-Box" Distributor show how this rugged hoist can cut your load handling costs. Or write direct for Bulletin 410.

'Load Lifter' ® ELECTRIC HOISTS

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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

plastics usage delivered recently before the American Society of Body Engineers, Detroit, said that time and labor savings achieved by rapid fabrication, light weight, and durability of plastics have led to their constantly increasing use all the way from models and prototypes employed to establish trim lines and reliable contours, to production tools with complex contours, many with metal inserts to provide longer wear at points of stress.

Reduce Operations

The experience of one company was cited to illustrate the fact that automobile tail-light stampings can now be made in five operations rather than the nine formerly required. Short-run production stampings are made on plastic dies with less servicing than would be needed to spot-in a metal tool, it was stated.

Among other examples of plastic tooling progress cited was Chrysler's use of phenolic dies to produce prototype automobile panels, Fisher Body's use of stretch dies and other tools cast from a self-curing epoxy with a low-cost foam core, and Ford's utilization of plastic dies in development work determining the practicality of unusual designs. Estimates of savings as high as $250,000 were tied in with Ford's ability to alter plastic dies as often as four or five times in a single week to come up with satisfactory panels and adopt final die contours for metal production dies used in long runs.

Common Applications

Among increasingly common applications of plastic tooling were included contour checking gages, drill fixtures, hole checking gages, assembly fixtures, buffing fixtures, and paint spray masks. For heavy-gage work, the report disclosed, a core resin with a high compressive strength is now undergoing testing. It was said that this material, which requires a short heat cure, should provide a method of casting dies without a laminate for short runs of 0.030 to 0.040 steel.

Developments whose public announcement was predicted include nontoxic hardeners for epoxy resins; a foam epoxy for setting at room temperature; stable phenolic board that can be planed, drilled, or scraped by wood tools; troweling and splining resins which will not sag or run out of shape even on vertical surfaces and will set in one hour; and a metal-filled epoxy resin for casting, with a heat resistance of 300°F and fairly high heat conductivity.

Automation:

Six jobs at one machine loading assure correct tolerances.

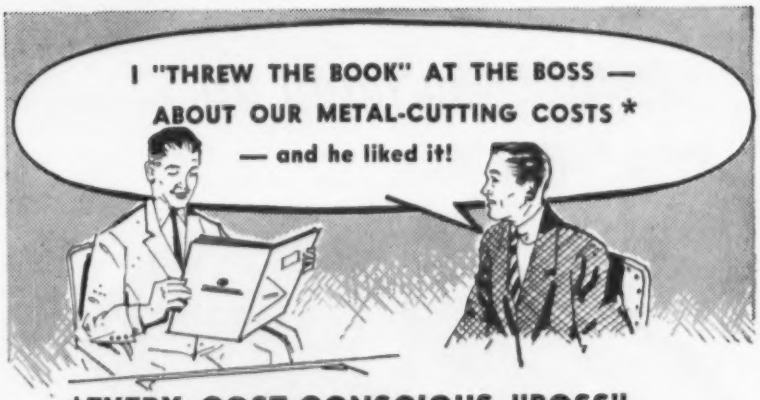
Metal working manufacturers often face the problem of holding critical dimensions as a workpiece is shifted from one machine to another through a series of operations. Recent strides toward more versatile machine tools are easing this situation. One such machine automatically performs six separate operations on an automobile engine block at one loading.

Operations completed by the machine include finish-boring main bearings, boring dowel holes, boring camshaft bushing holes, boring distributor and oil pump shaft holes, and milling the oil pump pad. Older processing methods normally assign such operations to individual machines. This involves unclamping the part, moving it to the following station and reclamping it for the next operation at that point. Since clamping is never identical at different stations, inaccuracies affecting critical dimensions commonly occur.

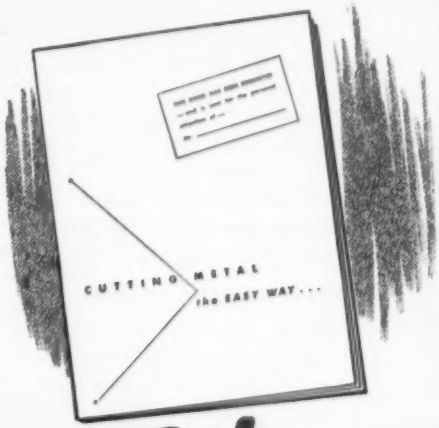
Cutting Time Speeded

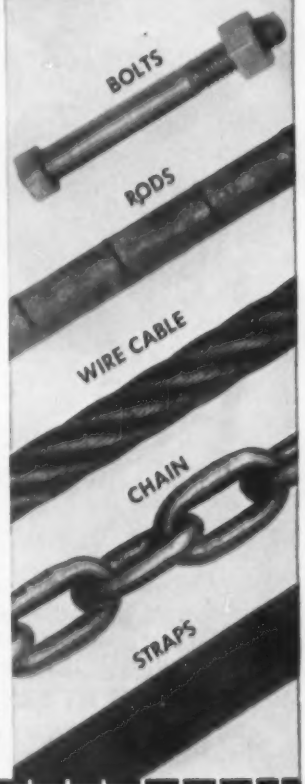
Throughout the six-operation cycle, the engine block remains clamped in one position. Surfaces and holes are machined progressively or simultaneously and their related dimensions are held within acceptably close limits. Actual cutting time per block per cycle is speeded up.

To compensate for the dwell-time occasioned by six operations



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"Delivery of machine blocks is coordinated with production line speed . . ."

at one point, engineers at Chrysler Corporation's Plymouth Division, Detroit, have included a "bank" of three processing machines in each unit. Blocks are diverted from the main production line into the unit, are processed and checked there and returned to the main production line. Delivery of machined blocks is coordinated with production line speed so the engine blocks will reach subsequent operation stations along the main line at desired intervals.

Maintenance and repair of the automation unit are simplified by using standard components in this and other machines of the supplier, Ex-Cell-O Corp., Detroit. Quick replacement of parts and subassemblies reduces downtime, labor and production costs.

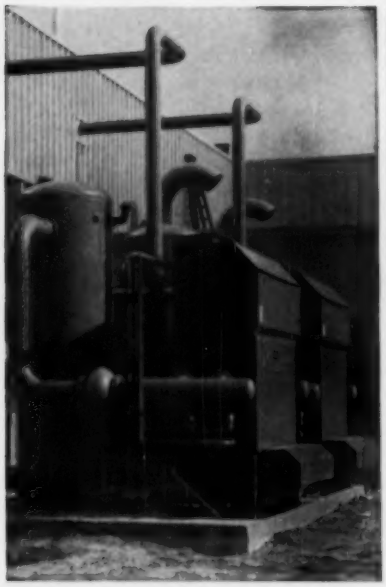
Materials:

Grade of vulcanized fibre includes rubber sizing.

A new grade of vulcanized fibre —RS-10H—has been developed as a gasketing material with additional application as a packing and facing material and as a pos-



Rubber sized vulcanized fibre has hardness reading of R_B47.



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Write for Bulletin No. 130

NIAGARA BLOWER COMPANY
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sible substitute for rubber coated paper. The material, developed by the National Vulcanized Fibre Co., is reported to combine the desirable properties of both rubber and vulcanized fibre. With a friction coefficient 30 to 50 pct higher than that of standard vulcanized fibre and improved chemical resistance, it has possible applications where these properties are required.

Development Described

In developing the new rubber sized fibre, product design engineers at National selected Hycar type synthetic rubber because it can be precipitated directly on paper fibres—in contrast to other types which can only be coated on the paper surface. Uniform dispersion of Hycar throughout the vulcanized fibre makes this material particularly suited for abrasion-resistant uses, since it does not have a surface coating to wear off.

Compared to vulcanized fibre, rubber sized fibre is about 70 pct more compressible and 69 pct more resilient—properties of advantage in gasketing applications. Both its fibre and rubber components, moreover, are not affected appreciably by oil, making possible its use for gasketing various types of pumps.

National's RS grade fibre is now supplied in thicknesses from 0.015 in. to $\frac{3}{8}$-in. inclusive. NEMA standards for sheet sizes and thickness tolerances apply.

Instruments:

Brush wire held to tight tolerances

A wire brush plays a vital role in the operation of electrical computers where the wires make contact with holes in a punched card, and upon proper register, activate the machine to record the desired information.

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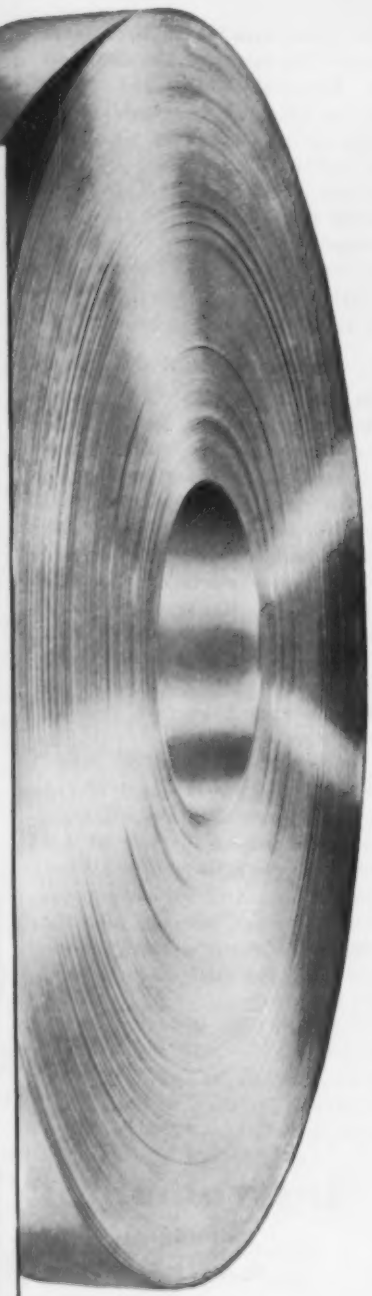
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perfect straightness. The wire, which is a tempered music spring wire, has a tensile strength of 300,000 lb per sq in. and is drawn to .008-in. with a size tolerance of −0.0002 in. and +0.000 in.



Wire in this midget brush has a tensile strength of 300,000 psi.

Minute in size when compared with the machine it activates, the brush, consisting of a steel jacket and 18 strands of wire, measures only 2½-in. in length, is less than 1/16-in. thick and ¼-in. in width. The specially-tempered wire used in fabricating the contact brushes is made by the Worcester Wire Works Division of The National-Standard Co., Worcester, Mass.

Machining:

Broaching method developed for internal helical gears.

A leading automotive transmission builder has successfully converted production of several large internal helical gears to broaching. Working with the transmission builder, Colonial Broach & Machine Co., Detroit, developed machines and tooling to maintain the high accuracy and volume required for these gears.

The decision to broach these gear teeth was influenced by the repetitive control of size and quality and simplification of gear shaving following broaching. Automatic loading and unloading features obtainable with this setup

permit fully automatic machine cycle and minimum manual part handling.

Vertical pull-up type machines were selected and have full follow-through lower handling to support both ends of the tool during the cutting stroke. Two-station broaching machines with 75 ton maximum capacity are used in the production line pulling two broaches at one time.

Universal Design Used

Since three different gears required broaching, two left hand and one right hand spiral, all three having different leads, the transmission builder requested a universal design permitting broaching of any gear on either station or like gears on both stations. A single spiral drive head unit was then designed so that each station on the machine was independent of the other permitting right or left hand helix angles of any given lead to be broached on either station.



These gears are broached at a rate of 252 parts per hour.

The basic shuttle fixture was also designed so that by a simple change in adapters, any one of the three different gears can be broached on any station or the same gear can be produced on both stations. Production of the gears with the greater face width is reported as 168 parts per hr with the narrower gear produced at 336 parts per hr or a combination of both sizes yielding 252 parts per hr.

Operation Explained

Operation of the machine is simple, as the operator merely loads blanks in the magazine loading

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FINDER SLEEVE ASSEMBLIES			X		
INSERT BITS AND BIT HOLDERS	X	X	X	X	X
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HAND BRACE BIT HOLDERS	X	X	X	X	X
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device with the machine on automatic cycle. The parts are automatically selected and moved into broaching position. Following the cutting cycle, they are shuttled out and discharged through individual chutes into containers provided on either side of the machine. The operator's function is to maintain a supply of parts in the loading magazine and the balance of the cycle is automatic.

Welding:

Rotary index machine performs six operations.

An automated six-station rotary index machine presses, induction-preheats, performs two running-spot argon shielded-arc welding operations, wire brushes and automatically unloads an internal gear and stamped hub assembly at a 260 per hour rate.

The machine has an unusual, automated fixture arrangement. Air-powered clamping fixtures which hold the two parts are tilted by cams to various angular positions during index.

Gear drives in each fixture are provided to rotate the parts at welding and wire brushing stations. Jaw clutch halves in the fixtures are engaged by mating clutch halves in the motor drives. These are mounted on the wing bases at the welding and wire brushing stations. Aluminum alloy housings are provided for the fixtures. The unit was designed and built by Expert Welding Machine Co., Detroit.

New Films:

"Die Casting—How Else Would You Make It?" A 35 min., 16 mm color and sound film shows how designers may cut costs and shape a better product through use of the die casting process. The film depicts the scope and versatility of the process by illustrating the production and use of die castings in commerce, industry, transportation and the home. Write the

American Zinc Institute, 60 E. 42nd St., New York 17.

"Forging in Closed Dies." A 33 min., full-color film shows the process of forging, as carried out at the present time in 14 leading American forging plants. Included are designing and preparation of the dies and operation of the hammers and presses on which the dies are used to produce forgings. Modern equipment—steam and air lift hammers, board hammers, mechanical and hydraulic forging presses and upsetters are all shown in action. Drop Forging Association.

"The First 5,000,000 Miles." A sound, color picture giving a report on the new Southern cast steel wheel for railroads. The movie tells the story of the research program undertaken to develop this heavy-duty wheel. In addition, the audience is taken on a tour of the plant where 400 of the wheels are produced a day. American Brake Shoe Co., 230 Park Ave., New York 17.

Pack Turnover technique of turning over stacks of sheet metal or tin plate mechanically as a unit rather than one sheet at a time is explained in a new film. The movie illustrates how a fork truck carries loads to the pack turnover unit and places them in the machine. An upside-down pallet is placed on top of the load, the driver pushes a button and the turnover rotates the load, turning it upside down. Dexter Folder Co.

"Mining for Nickel." A 45 min., sound, color film outlines the history of nickel mining in the Sudbury area of Canada and covers in detail the development of a mine and six methods of extracting ore. Explosion shots and shaft sinking operations are included in the picture. Animation is used to demonstrate the fundamental principles of mining engineering and illustrate methods of economically extracting ore from the earth. The International Nickel Co., Inc., 67 Wall St., New York.

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Spun spheres protect mechanical fingers of world's toughest recorder

another example of Spincraft's "start-to-finish" fabrication

15 Different Operations —

The sphere, protecting the delicate sensing instruments, is completely fabricated by Spincraft. The sphere consists of an outer steel and inner aluminum shell separated by insulating material. The two hemispheres are joined together by an ingenious locking and sealing arrangement. Spincraft's complete fabricating responsibility involved spinning, machining, arc-welding, spot welding, brazing, grinding, sawing, drilling, braking, stamping, phosphate plating, anodizing, painting, assembly and pressure testing. Craftsman (above) is shown assembling a Flight Recorder.









This aircraft Flight Recorder, manufactured by the Mechanical Division of General Mills, etches a continuous 300-hour record of heading, air speed, vertical acceleration and altitude on aluminum foil. Each Recorder is fully-enclosed and protected in a specially fabricated sphere — made by Spincraft. The recording device, when enclosed in the sphere, is designed to withstand shocks of 100G's and resist temperatures of 2000°F up to 30 minutes.

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Miller uses horizontal spindle for indexing

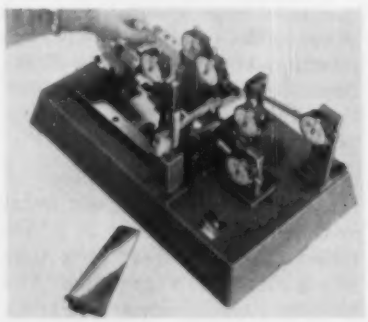
The horizontal spindle, rather than the saddle and table, indexes for universal operation on a new milling machine. The spindle is mounted in a massive turret, which may be swiveled 360° by means of a worm and worm wheel. When used as a universal horizontal miller, the spindle is indexed to the required angle, rather than swiveling the saddle. This feature is reported to provide extreme rigidity for precision work, while table retains stability and turret locks securely at the desired angle. In addition to universal and horizontal operations, the miller will perform vertical and angular milling operations. The unit weighs 4500 lb, with 30 in. of horizontal travel, 11 in. of cross travel and 16¼ in. of vertical travel. *U. S. Burke Machine Tool Div.*

For more data circle No. 27 on postcard, p. 157.

Indicator gages check jet compressor blades

The thickness of jet compressor blades can be measured at six different points simultaneously on a series of multiple dimension dial indicator gages. Each gage in the series checks a different size blade. In inspection a blade is placed in the gage so it rests on three points and is located from its trailing edge and root. After it is located properly, a hand lever moves the gaging contacts into position and the indicators show any deviation in thickness from a master part at six separate locations. Checking six points at once means there is gaging speed for inspection without slowing production. *Federal Products Corp.*

For more data circle No. 28 on postcard, p. 157.





Checker inspects gears up to 18-in. diam

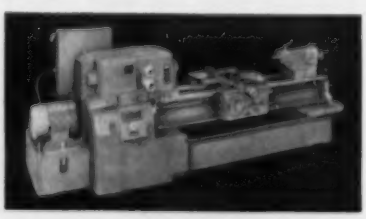
A new model 18-in. Red Ring gear checker for inspecting spur or helical internal gears up to 18-in. pitch diameter is now available. It checks internal helical and spur gear tooth-to-tooth spacing, pitch or root diameter eccentricity and size as well as parallelism of spur gears from 2 to 48 diametral pitch having pitch diameters from 2 to 18 in. The machine consists of a cast iron base that supports a precision ball bearing vertical work spindle. Head that checks tooth spacing, size and eccentricity is mounted on an adjustable overarm. This overarm is supported by a vertical cast iron member slide-mounted on the base and raised up and down by hand wheel controlled rack and pinion counter balanced drive. *National Broach & Machine Co.*

For more data circle No. 29 on postcard, p. 157.

Expand line of preselective speed lathes

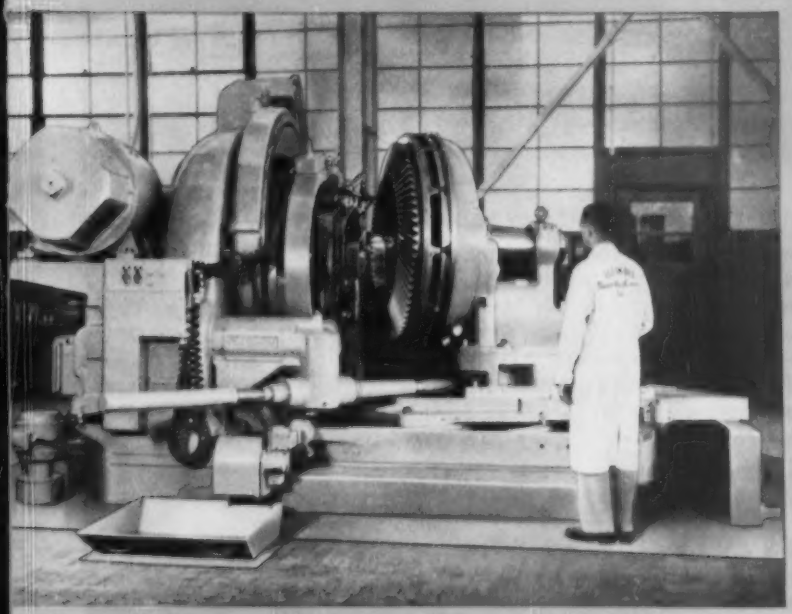
Eight new models have been added to a line of single spindle lathes which incorporate a preselector Dyna-Shift headstock. With this headstock, the operator can automatically obtain the correct spindle speed with one dial. The dial may be set to the spindle speed desired for the next cut on the workpiece, while the lathe is making a cut. *Monarch Machine Tool Co.*

For more data circle No. 30 on postcard, p. 157.



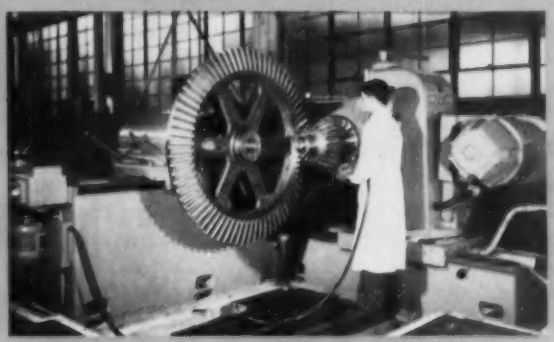
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BIG SPIRAL BEVEL ZEROL BEVEL HYPOID GEARS

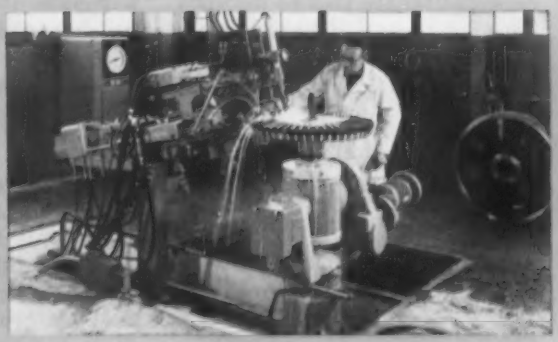


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This new No. 170 Spiral Bevel and Hypoid Gear Generator is the nucleus of the most modern and productive unit of large bevel gear generating machinery in the world. It generates spiral bevel, zerol bevel, and hypoid gears to 72" diameter, 2.875" tooth depth (.75 D.P.), 10" face, and 10" hypoid pinion offset above or below centers. The localized gear tooth bearing, an established necessity for today's heavily loaded gear drives, is precisely controlled to your specifications.



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Shell lathe controlled from central station

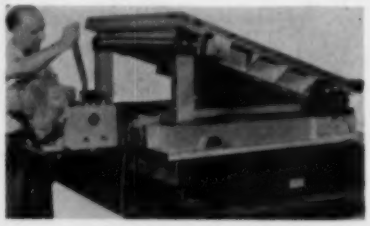
A lathe for production of 18-in. shells rough turns outside diameter, finish faces and chamfers the base end. The lathe incorporates seven overhead, individually-controlled, contour turning tools, and base facing and chamfering tool. Rough and semifinish cutting takes place in a sequenced automatic cycle controlled from a centralized push-button station. *The Cross Co.*

For more data circle No. 31 on postcard, p. 157.

Large sine plate has powered adjustment

A sine plate 48 in. x 48 in. which has 2304 sq in. of working area has been developed. It features: electrical control of mechanical raising and lowering of the heavy top plate; quick, silent adjustment with 1 hp motor; and fine adjustments of the top plate on the gage blocks or standards with a hand control wheel. Maximum angle setting is 60°. *Omer E. Robbins Co.*

For more data circle No. 32 on postcard, p. 157.





Constant force machine for fatigue testing

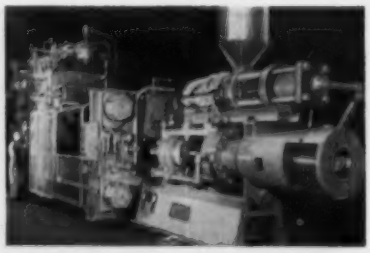
A new fatigue testing machine with a total force capacity of 12,000 lb., the Ivy-12, is said to be the first constant force machine designed for multi-range fatigue testing. The model is one of a standard line of similar machines with capacities ranging from 200 lb to 120,000 lb. The multi-range feature provides two test stations—one for high force and the other for high amplitude operation. The table surface of the unit is 71 in. x 79 in. and 37¼ in. high, with five T-slots in each direction. *The Ivy Co.*

For more data circle No. 33 on postcard, p. 157.

Large injection molding machine for plastics

A new plastics injection molding machine with 3000 ton lamp pressure and 400 oz capacity has been developed for the plastics industry. Reported to be the largest, high-speed injection machine ever provided for plastics, the unit completes a dry cycle in 22 sec. Features of the unit include: a high injection speed of 400 oz in 6 sec; a positive shot measuring device; and a pre-plasticizing chamber. *The Hydraulic Press Mfg. Co.*

For more data circle No. 34 on postcard, p. 157.





Lift truck handles skid platforms or pallets

Hinged superframe on a new short-coupled JackLift electric pallet truck enables it to handle skid platforms as well as pallets. This superframe is locked in up position when pallet handling, brought down for handling skid platforms. It increases the lowered height to any amount up to 11½ in. The truck with a vertical lift of 4 in. can handle single or double face pallets and skids of any underclearance. The JackLift, equipped with superframe, is only 27⅞ in. long and is available in capacities to 6000 lb. The drive unit is a double reduction gear drive with traction speeds of 3 mph empty and 2.2 mph loaded. *Lewis-Shepard Products, Inc.*

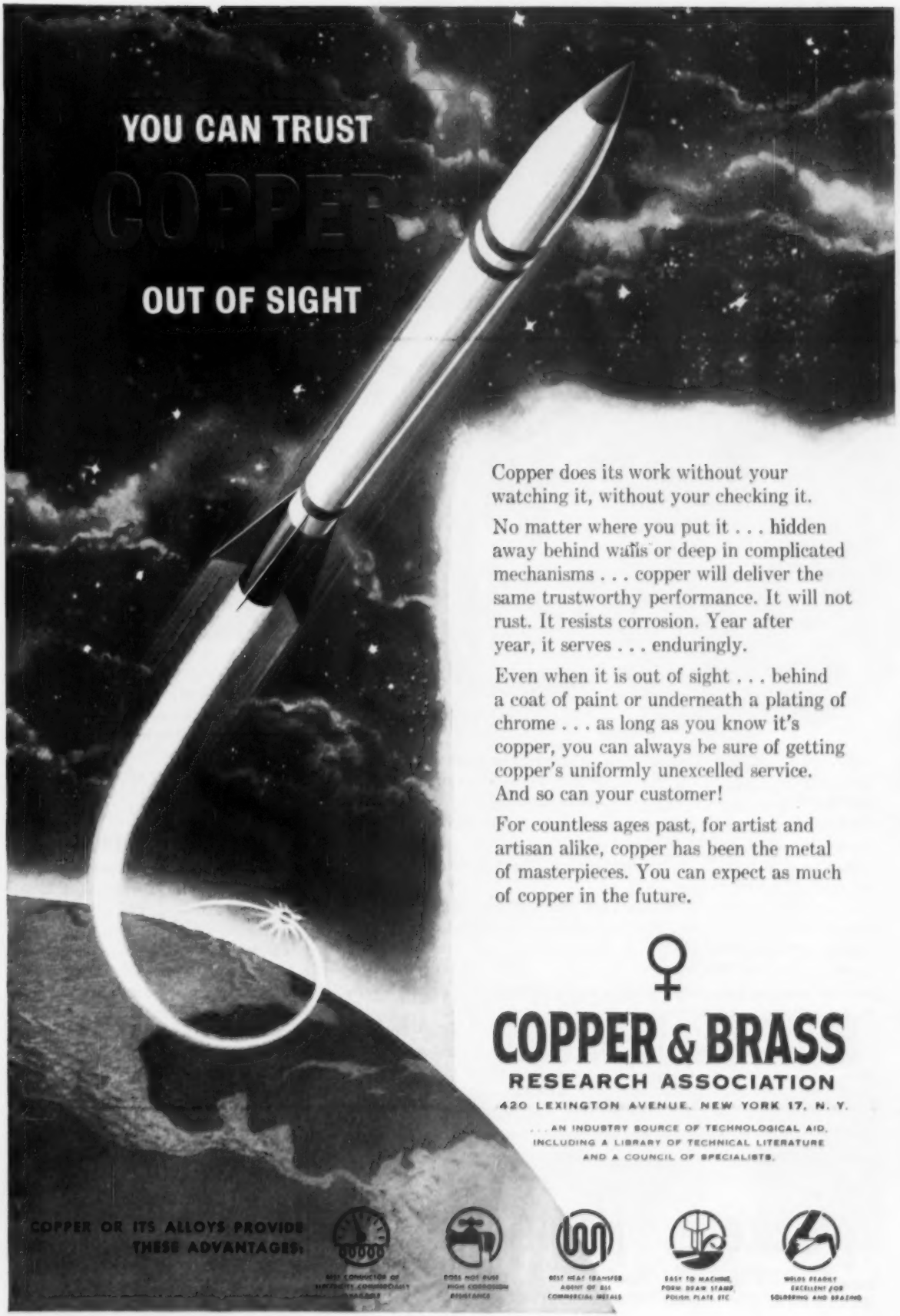
For more data circle No. 35 on postcard, p. 157.

Magnetic and adjustable V-block for grinding

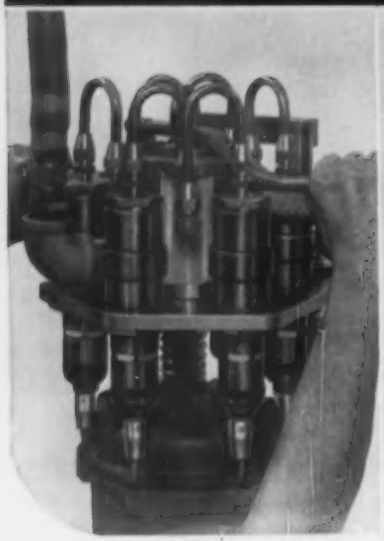
A magnetic adjustable V-block is made of alternating laminations of non-magnetic brass strip and material with high permeability and low residual magnetism. This V-block is quick setting because of the elimination of sine bar, gage block and indicators. The unit can be used on drill presses and other machines equipped with magnetic chucks. It is recommended for toolroom and layout work, and for high-quality, close tolerance production work. *Anton Machine Works.*

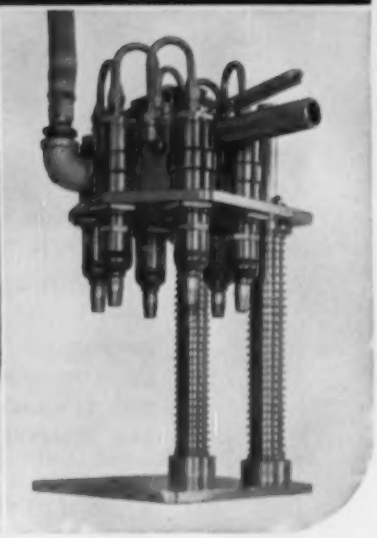
For more data circle No. 36 on postcard, p. 157.




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COMMERCIAL METALS
EASY TO MACHINE,
FORM DRAW STAMP,
POLISH, PLATE ETC
WELDS READILY
EXCELLENT FOR
SOLDERING AND BRAZING

BUCKEYE multiple-unit
fastening and drilling tools
reduce assembly time and costs on any
operation involving two or more fasteners.





Now—an entire assembly operation, where two or more fasteners are used, can be completed in the same time required to drive a single fastener. The savings you can make will increase directly with the number of tools in your Buckeye multiple-unit tool. You decide how many screws or nuts you wish to drive—simultaneously . . . or how many holes you want to drill—simultaneously . . . you're limited only by the air supply available in your plant.

Tools can be positioned to match any horizontal drilling or fastening pattern, and to compensate for any differences in vertical position of screws, nuts or workpiece. A Buckeye multiple-unit tool will drive screws and nuts of different sizes and types . . . will drill holes of different sizes and depths—and do either job simultaneously. Tool capacities, in multiple units, are identical to individual tool capacities.

Buckeye multiple-unit fastening and drilling tools are engineered to your specific requirements. They may be arranged on self-supporting arms, as illustrated, or designed for suspension above the work. Just send a letter or sketch, outlining your assembly operation, or ask to have a Buckeye Tools Sales Engineer visit you. Either way, it costs you nothing to learn how you can step up assembly output and cut assembly costs—simultaneously.

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producers of
the world's first
successful
rotary air tools

Rivet spinner

High speed spinning rivet machine forms perfect rivet heads noiselessly. Rivet capacity is up to 5/16 in. diam, spindle travel is ¾ in. adjustable downward. Available



in both floor and bench models and designed for either foot or air operation. Air operated model is designed to eliminate operator fatigue and assure uniform assemblies at every cycle. *High Speed Hammer Co.*

For more data circle No. 37 on postcard, p. 157.

Immersion thermocouple

Where the accurate measurement of temperatures in the range of 2500-3200°F, and long life of the thermocouple are prime considerations, an immersion thermocouple can be supplied made from elements which consist of platinum alloyed with 5 pct rhodium and platinum with 20 pct rhodium. The melting point of platinum 5 pct rhodium is higher than that of pure platinum, it is stated, and therefore permits operation with safety to a somewhat higher temperature. This alloy has about twice the strength of platinum and has metallurgical characteristics which result in extremely slow grain growth, a combination of properties which ensures longer life with maintained accuracy. *Charles Engelhard, Inc.*

For more data circle No. 38 on postcard, p. 157.

Flexible control center

A new instrument control center has been developed to provide not only a continuous operational temperature check on a process, but also to check on and adjust individual temperatures whenever any point is out of limits. This new center—which has the capacity of scanning and controlling up to 72 stations—has been designed around a Wheelco Capacitrol unit, neon pilot lights,

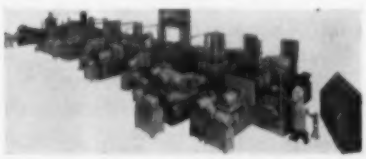


pulse actuated stepping switch, pulsing timer and small two-tube non-indicating controllers. It automatically checks the temperature at each of the control stations in a fixed time interval. The amount of correction needed at any point is indicated by the Capacitrol unit. *Barber-Colman Co.*

For more data circle No. 39 on postcard, p. 157.

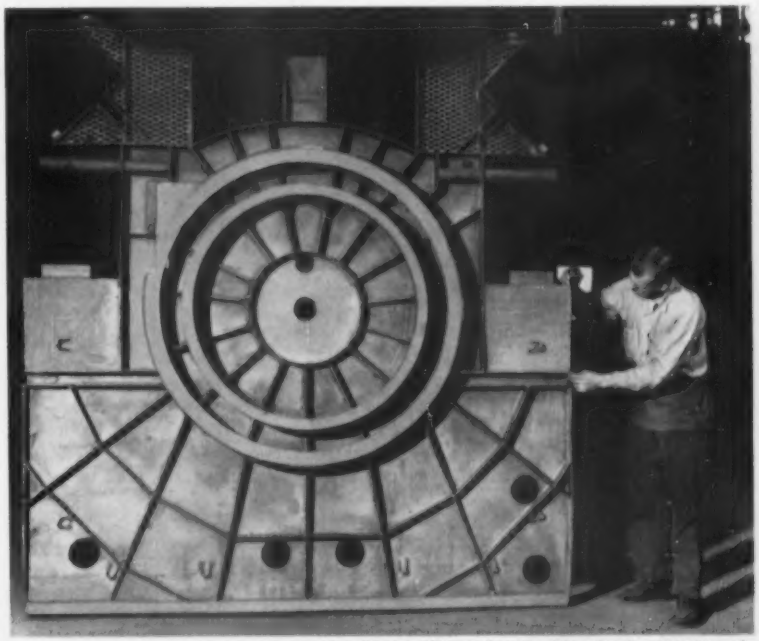
Transfer machine

A 45-station transfer machine performs 249 drilling, boring, reaming and tapping operations on 52 automatic transmission cases at one installation. This transfer, which



combines a battery of three machines, features electronic mechanisms for assignments of machining operations. *Buhr Machine Tool Co.*

For more data circle No. 40 on postcard, p. 157.



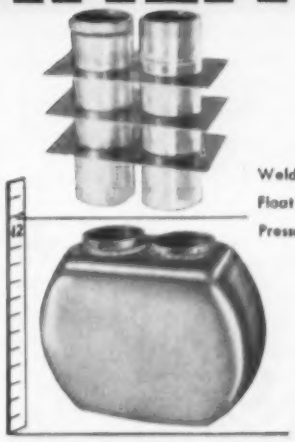
Gun Carriage (Upper Section of Two-Ton Steel Weldment)

Metalworking

VERSATILITY

The two-ton steel weldment *above* and the twelve-pound aluminum assembly at the *right* vividly illustrate Brandt's metalworking versatility . . . the highly successful coordination of 64 years of metalworking experience with extensive and modern facilities.

Although vastly different in size and basic material, both products illustrated were manufactured in quantity to rigid specifications and close tolerances . . . and delivered *on schedule.*



Welded Aluminum Float Assembly Pressure Tested

FOR **FORMINGS, STAMPINGS, WELDMENTS LARGE** OR **SMALL . . .** IN **ANY KIND** OF **METAL . . .**

Make Brandt Your Extra Plant!

FOR MANUFACTURING EXECUTIVES . . .

A comprehensive brochure, picturing the facilities at Brandt sent upon request.





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1700 Ridgely Street, Baltimore 30, Md.

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DEBURRING



• Deburring of gears isn't normally included in specs or drawings. And we don't get paid for it. But here at BRAD FOOTE we take pains and expend many man hours on deburring—for we know that one tiny burr can ruin a $100,000 machine.

• Examine your next shipment of gears. See whether your present supplier is painstakingly removing all the burrs. Find out how many hours your assembly department has had to charge against deburring. See another way in which BRAD FOOTE quality and extra attention to details saves you money.

• Prove to yourself the savings that BRAD FOOTE quality can mean. Let us quote on the gear requirements for your next program—whether it be radar equipment, diesel engines, etc. BRAD FOOTE has experience in providing gears for almost every specialized application and would welcome the opportunity of discussing your gear problems.

BRAD FOOTE MAKES ALL TYPES OF GEARS—IN A COMPLETE RANGE OF STYLES AND SIZES

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"From the punch press department. Shows how production climbed this year with Columbia EXL-DIE!"

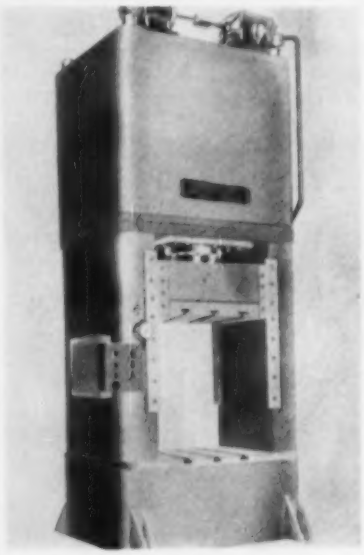
COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

Hydraulic press

A double-action hydraulic press, electrically controlled for either automatic or semi-automatic operation, can be built to meet practically any speed, stroke or platen size requirement. It is available in

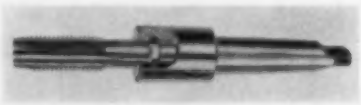


capacities of 50, 150, 200 or 300 tons. The new side frame, double action press may be equipped with hydraulic cushions in the bed for metal drawing applications. *Clifton Hydraulic Press Co.*

For more data circle No. 41 on postcard, p. 157.

Heavy-duty tap holders

Precise centering action for accurate tapping is provided by a new line of heavy-duty tap holders. Designed for use in radial drills, drill presses, lathes, boring mills, milling machines and tapping machines, the new tools feature a new style snap ring. It grips the shank of the tap, holding it securely in



place in a central position. Set screws are eliminated. The square of the tap shank fits securely in the broached square of the holder to provide a positive drive which eliminates slipping and possible tool damage. *Scully-Jones and Co.*

For more data circle No. 42 on postcard, p. 157.

Fork truck operates without gears or clutch

A new Model L-524 mobilift fork truck of 5000 lb capacity at 24 in. load center is designed with a direction control which eliminates clutch and gear operation. All forward and reverse movement is activated by one fingertip control. Another fingertip lever controls the two speed transmission which affords a high and low range, both forward and reverse. *Lamson Mobilift Corp.*

For more data circle No. 43 on postcard, p. 157.



Drill-tapper

A new multi-spindle, small-hole drilling and tapping unit has been designed for installations where faster precision work is desired without the purchase of special equipment. Using a universal joint head to provide flexibility in bolt circles and arrangement of spindles, the machine drills 8 holes up to No. 25 or taps 8 holes up to No. 10-32 in mild steel at one operation. Spindle speed is 2700 rpm and estimated operating speed 1200 strokes per hr. Larger holes may be drilled



or tapped in more readily machinable material or where fewer tools are used. Spindles are adjustable to a min. spacing of ¾ in. within an 8 in. bolt circle and special fixed center heads or adjustable heads with fewer than 8 spindles are available. The machine has a stroke of 4 in. and the head is adjustable up and down to provide clearance between spindle nose and table from 1 to 12 in. *The Cleveland Tapping Machine Co.*

For more data circle No. 44 on postcard, p. 157.

Tube fittings

Tube fittings for internal straight thread boss mounting are announced. Fittings were developed to solve tapered pipe thread leakage problems in high pressure hydraulics. The new straight thread fittings utilize O-ring sealing. Made in steel, they are offered in both the Triple-lok standard J.I.C. 37° flare type and the Ferulok flareless type. *Parker Appliance Co.*

For more data circle No. 45 on postcard, p. 157.



"Now we can handle more and bigger jobs"

The experience of Michigan Machine and Tool Co. duplicates that of many other custom die shops who have installed a Dake Die Try-Out Press

Michigan Machine & Tool Co. of Grand Rapids earned an enviable reputation as diemakers for a number of important manufacturers, but they were limited to building smaller size dies for lack of try-out facilities.

"We found it quite impractical," they said, "to interrupt a customer's production while we tried out a die on his press."

Since installing a Dake Die Try-Out Press, Michigan Machine & Tool Co. is being commissioned to make more dies, and bigger dies . . . bringing a substantial increase in business and correspondingly in profits.

Information on Dake Die Try-Out Presses is contained in Bulletin No. 330 . . . send for a free copy today.

DAKE CORPORATION, 602 Seventh St., Grand Haven, Mich.



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NOW-Make Your Own Oxygen and Nitrogen in One Generator

... and Save Up to 50%!



With INDEPENDENT'S newly-designed generators, you can make your own high-purity oxygen and nitrogen from the free air . . . and in the same generator.

You reduce costs up to 50% by eliminating handling costs . . . vaporizing costs . . . evaporation losses . . . residual losses . . . and transportation costs.

INDEPENDENT Generators are available in any capacity, any purity and any pressure. Put your oxygen-nitrogen problem up to us . . . our engineering department will gladly submit recommendations . . . no obligation, of course!

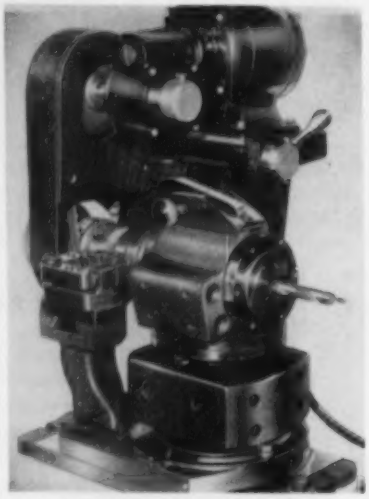
INDEPENDENT ENG. CO., Inc.

CONSULTING · DESIGNING · RESEARCH

O'FALLON 4, ILLINOIS

Form relieving fixture

A form relieving fixture has been developed in a motorized model for tool grinding departments where a quantity of tools of one design are ground at a time. The power-operated fixture replaces hand grinding, while the drive is engineered to deliver a constant high torque output. *Royal Oak & Machine Co.*



For more data circle No. 46 on postcard, p. 157.

Airlift tables

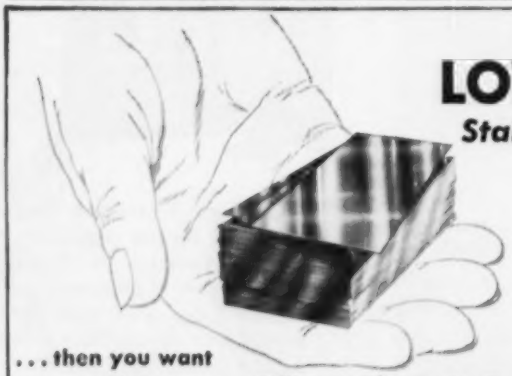
New airlift tables are designed to aid handling of a heavy work piece or fixture being moved or indexed by simply floating it on air. The tables consist of either one or two plates. In the case of double rotary plates, the lower one is provided with air passages. Calculated orifices permit a metered amount of air to be interposed between plates. The air film isolates one plate from the other and permits it to float the upper plate with its load. Release of pressure brings about contact of plates and allows for full cutting pressure on the work. *James C. Hartley Assoc.*



For more data circle No. 47 on postcard, p. 157.

Looking For

LOW COST Stainless Steel?



... then you want

MicroRold® 430!

MicroRold Type 430 is a straight chromium-stainless with a nominal composition of 17% chromium. Though it is less resistant to corrosion, it retains all of the other desirable qualities of stainless and has proven very satisfactory in a wide range of mild corrosion applications.

MicroRold 430 is the least expensive of all stainless types because it does not contain nickel. This results in a 7¾c per pound difference in base price between Type 430 and Type 302, the most popular higher grade stainless. A saving of $155 per ton is possible and is of merit to cost-conscious fabricators.

Considering the price advantage, with no sacrifice in quality when applied properly, you will find MicroRold 430 a worthwhile material for your product.

Your steel distributor can help you get the most for your stainless steel dollar. He will gladly tell you the MicroRold Story.

Washington Steel Corporation

WASHINGTON, PENNSYLVANIA

Clamp-on loupe

A loupe with a 5X power lens is easily clamped on and may be used with center-mics, height gages, michrometers, verniers, depth michrometers, slide rules, checking

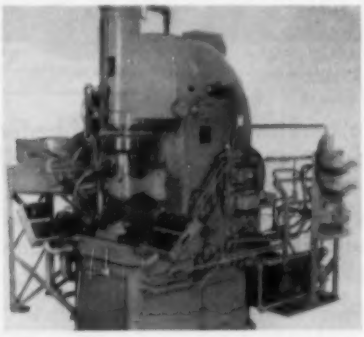


fixtures and other types of equipment. It can be employed by tool and die makers, bench and floor inspectors, engineers, casting and tool checkers. *Englass Co., Inc.*

For more data circle No. 48 on postcard, p. 157.

Auto part assembly press

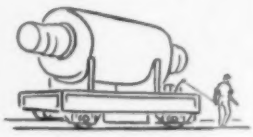
A 25-ton press with electrical controls automatically assembles and stakes the drive flange of an automotive transmission to a pinion gear and then assembles a bushing into the gear. Machine is equipped with special work base, hydraulic assembly cylinder, hydraulic loader



and hopper feed. A spiral bar and nut assembly guides the flange in assembly to the helical spline teeth of the gear. The complete cycle for assembly of the work piece is 17 seconds. *American Broach and Machine Co.*

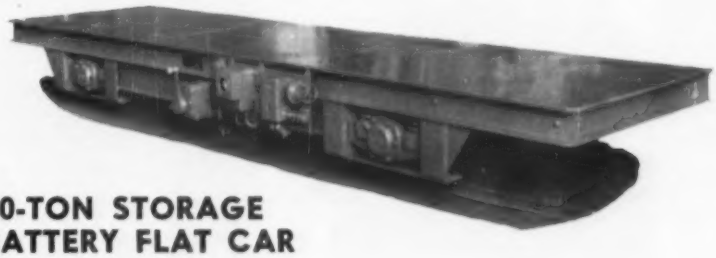
For more data circle No. 49 on postcard, p. 157.

ATLAS SAFETY TYPE

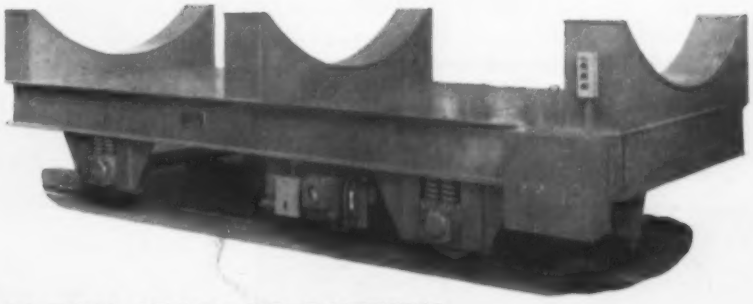


"SHORT HAUL" TRANSFERS

Atlas Safety-Type Transfers provide safe, low-cost service. Available with gas or diesel-electric, cable reel, or storage battery power. Atlas Transfers handle any type of load . . . and the heavier the load, the greater the savings.



20-TON STORAGE BATTERY FLAT CAR



20-TON STORAGE BATTERY WITH CRADLE FOR PIPE

Request "Walk-Along" Bulletin 1283



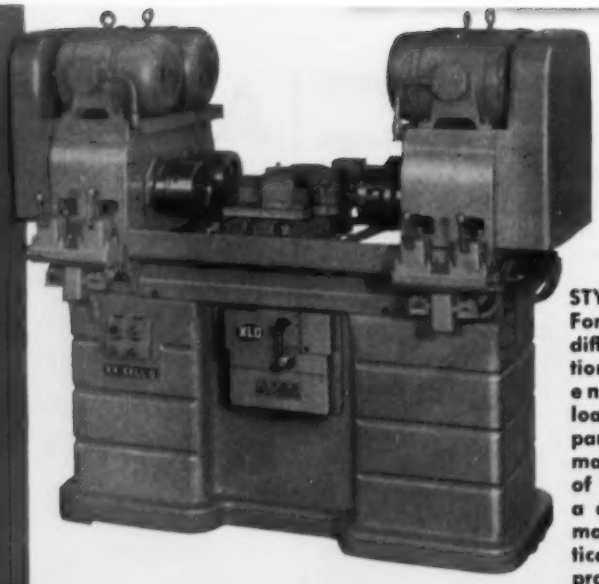
THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

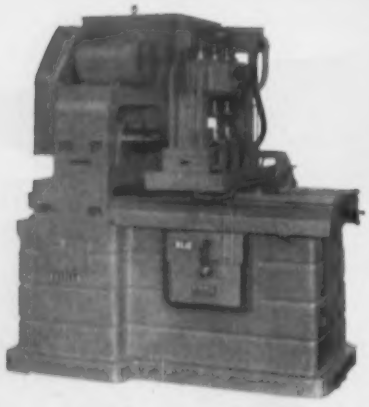
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STYLE 2112-B. Single-end model for work pieces in the small and medium-size range. Flexible hydraulic controls give easy adjustment of multiple operations.



STYLE 1212-B. For identical or different operations at each end. When loading time of parts approximates the time of machining, a double-end machine practically doubles production.



STYLE 112-D. Large and sturdy with long stroke. Accommodates medium and heavy work, gives maximum precision production, minimum operating cost.

WHICH MODEL FITS YOUR PRODUCTION?

Ex-Cell-O Precision Boring Machines

XLO

EX-CELL-O for PRECISION



STYLE 17-A. Massive construction. Maintains the highest precision standards on a profitable production basis. Economical in operation, can be tooled for a wide range of production jobs.

You can precision-bore, turn, face, counterbore, chamfer, or groove with these fast, sturdy, flexible EX-CELL-O machines.

These are standard machines that handle many kinds of precision operations. EX-CELL-O has the *standard items of tooling* to make this possible at minimum cost.

Any EX-CELL-O Precision Boring Machine will give you *precision work at maximum production* speeds, with a minimum of investment.

Get all the facts about them from your local Ex-Cell-O representative, or write for a Precision Boring Catalog.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES
CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS
AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

55-51

The Iron Age SUMMARY . . .

More steel price boosts are coming . . . Base and extra prices of major products are moving up . . . Scrap prices set record . . . Mills sold through first half.

Steel Prices Again . . . All bets are off on steel prices. It's only a matter of time before steel consumers get the bad news on price boosts that will affect all major products. Base prices and extras are going up. The worst will be over in 90 days.

But it will be quite a while before the worst is over from a steel supply standpoint. Consumers who haven't the means or the ingenuity to get steel from other-than-usual sources, including conversion, will be in a bad way. More production cutbacks due to steel shortages are on the way.

The mills themselves hardly know which way to turn. Expediency is the by-word. Producers no sooner recover from one blow than they run smack into another. More troubles lie ahead. Freight car backlog alone will reach 150,000 by year's end.

The predicted scrap price breakthrough has happened. Prices have soared to record highs. Steelmaking grades have hit $50 and more in some districts despite desperate mill efforts to hold prices down. The Iron Age steel scrap composite price rose $2.50 to $49.50, a record. Sky-high prices for scrap going into conversion was the straw that broke the camel's back.

Outlook Gloomy . . . Mill production is sold out for the first six months of 1956. It's impossible to squeeze another ton into most mill schedules. And that takes into account the fact that producers have been forced to wipe out one or two month's production in the hope of becoming current on delivery promises. This means that output in the blanked-out period will fill orders promised for delivery several months ago.

The steel companies need more money to finance expansion. Higher prices are the most direct way to get it. With consumers grasping for every pound of steel they can get, this is as good a time as any to revise the price structure. Besides, steel production costs have been rising. Scrap is just one example.

Steel consumers are likely to squawk more about supply than about prices. Most of them are paying more anyway through buying from brokers, warehouses, and conversion.

At least three auto companies are knee deep in conversion, which is costly but worth it when the alternative is a possible production line slow-down in the midst of a stiff competitive race where early production is important.

Steel Output, Operating Rates

	This Week	Last Week	Month Ago	Year Ago
Production (Net tons, 000 omitted)	2,400	2,356	2,405	2,080
Ingot Index (1947-1949=100)	149.2	146.7	149.2	123.0
Operating Rates				
Chicago	99.0	99.0	99.0	89.5
Pittsburgh	103.0	99.0*	102.0	77.0
Philadelphia	103.0	105.0	103.0	71.0
Valley	99.0	98.0*	101.0	79.0
West	101.0	100.0	95.5	87.0
Detroit	98.0	97.0	95.0	88.0
Buffalo	105.0	105.0	105.0	100.0
Cleveland	97.0	99.0*	102.5	90.0
Birmingham	94.5	94.5*	94.0	66.5
S. Ohio River	90.5	94.0*	87.0	78.0
Wheeling	103.0	105.0	103.0	100.0
St. Louis	104.0	101.0	96.5	80.0
Northeast	88.5	89.0*	97.0	78.0
Aggregate	99.5	97.5	99.5	82.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.174	5.174	5.174	4.797
Pig Iron (Gross Ton)	$59.09	$59.09	$59.09	$56.59
Scrap, No. 1 hvy (gross ton)	$49.50	$47.00	$44.83	$32.17
Nonferrous				
Aluminum ingot	24.40	24.40	24.40	22.20
Copper, electrolytic	43.00	43.00	43.00	30.00
Lead, St. Louis	15.30	15.30	15.30	14.80
Magnesium	33.25	33.25	33.25	27.75
Nickel, electrolytic	64.50	64.50	64.50	67.67
Tin, Straits, N. Y.	103.875	99.125	96.25	89.875
Zinc, E. St. Louis	13.00	13.00	13.00	11.50

Price Hikes Highlight News

U. S. Steel ups cold-rolled spring steel $2 a ton, raises "extra" charges . . . Westinghouse still needs steel despite strike . . . Flat-rolled products in heavy demand.

◆ UPWARD MOVEMENT in steel product prices again highlights the news this week.

American Steel & Wire Division, U. S. Steel Corp., has increased the price of cold-rolled spring steel $2 a ton across-the-board. New prices are applicable at all AS&W production points. The only exception is at Worcester where the new price of $7.65 for .26-.40 carbon grade is off $4 a ton to meet competition.

U. S. Steel has also lowered cold-rolled strip prices in the New Haven and Worcester areas by $6 a ton to match competition.

In addition, the Corporation is raising its charges in dimensional extras for carbon, high strength, and electrical sheet and strip products. Dimension extras for lighter gages of hot-rolled sheets have been increased from $1 to $3 a ton. The extra for special killed quality is upped $2 a ton for hot-rolled sheets and strip, and $4 a ton for other sheet products.

Jones & Laughlin Steel Corp. has increased extras in hot and cold-rolled sheets. Gage and width extras in 14 gage and lighter are up $1 to $3 a ton. Drawing quality and special soundness are up $2 a ton. Specification extras for ordinary and higher quality sheets are up $2 a ton as are chemical extras.

Connors Steel Division of the H. K. Porter Co., Birmingham, has raised by $10 a ton the prices of carbon shapes and structurals, hot-rolled strip, carbon steel bars, and reinforcing bars. New price for carbon shapes and structurals is $5.10; for hot-rolled strip, $4.825; for carbon steel bars, $5.15, and for reinforcing bars, $5.15.

The company says the recent upward spiral in scrap prices has brought about the need for higher finished steel prices.

Despite the strike at Westinghouse Electric Corp., the company is buying all the steel it can get in order to build up inventory.

So far, the firm hasn't cancelled any sheet, plate, structural, or bar tonnage orders. One exception is electrical sheet which isn't posing serious headaches since the company has a good working agreement with a major electric sheet supplier.

Empire Steel Co., Mansfield, Ohio, has installed new cold rolling facilities which include a four-stand four-high tandem mill and a two-high temper mill. The entry and delivery equipment on both mills can handle coils weighing as much as 34,000 lbs.

SHEETS AND STRIP . . . Biggest consumer question in **Pittsburgh** right now is "where can I get some more steel?" Hot-rolled sheets are the tightest of all products to get hold of. The three major HR sheet suppliers haven't been selling this product for the past 9 months. One big producer recently stopped accepting any more orders. Result: most consumers are getting some tonnages, but are far short of requirements. Extra advances are reported from **Chicago** on hot and cold-rolled sheet and hot and cold-rolled strip. There's no confirmation so far on 1st quarter cold-rolled sheet conversion, but hot-rolled sheet is already booked. Sheet conversion deals are reported on the increase in **Detroit**. Demand from automakers has also tightened the supply of long terne sheet. A major **Cleveland** sheet producer reports that one large auto consumer has stepped up its delivery schedules for cold-rolled sheets 40 pct for December and January. This producer also mentions a few approaches on conversion, but none so far have come in from major producers. It is reported that a number of Pittsburgh and Detroit mills are being offered ingots for conversion if they can get the rolling time. Price is said to be no object. A scattering of conversion deals are reported in the **East**, especially in cold-rolled sheet and wide-width plate. **West Coast** mills expect flat-rolled product delivery schedules to get even tighter in 1st quarter. Part of this reasoning stems from the expected shutdown of a major mill during part of 1st quarter for equipment improvements.

IRON ORE . . . Universal pressure for iron ore has brought about the reopening of a Canadian mine closed for 85 years. Pickands, Mather & Co., **Cleveland**, with Iron Ore Co. of Canada, will start a $16 million construction program early next year at Bristol, Que. The two firms will split the cost of the $12 million processing equipment expected to deliver about 600,000 tons per year of 66 pct iron starting in late 1957.

PLATE . . . Conversion deals continue to show up in **Chicago** on light plate. Feeling is that tank demand plus that of linepipe and railroads will tie up this grade for most of next year. Delivery carryovers are running up to 60 days going into 1st quarter.

STRUCTURALS . . . Heavy demand for structurals is expected to keep up well into 3rd quarter.

Purchasing Agent's Checklist:

MACHINE TOOLS: Sales terrain shows more peaks than valleys ..... p. 95

HOME WIRING: 100 amp installations mean big jump in appliance sales ..... p. 99

METAL POWDER: Domestic shipments are three times better than '54 ..... p. 101

INDUSTRY: General Motors still under Senate quiz ..... p. 102

TECHNICAL: Modern broaching uses a variety of work-holding fixtures ..... p. 135

Comparison of Prices

(Effective Dec. 6, 1955)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Dec. 7 1955	Nov. 30 1955	Nov. 8 1955	Dec.7 1954
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.325¢	4.325¢	4.325¢	4.05¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.05
Cold-rolled strip	6.29	6.29	6.29	5.79
Plate	4.52	4.52	4.52	4.225
Plates, wrought iron	10.40	10.40	9.30	9.30
Stainl's C-R strip (No. 302)	44.50	44.50	44.50	41.50
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$9.05
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.75
Special coated mfg. ternes	7.85	7.85	7.85	7.85
Bars and Shapes: (per pound)				
Merchant bars	4.65¢	4.65¢	4.65¢	4.30¢
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Structural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38.25	38.25	35.50
Wrought iron bars	11.50	11.50	10.40	10.40
Wire: (per pound)				
Bright wire	6.25¢	6.25¢	6.25¢	5.75¢
Rails: (per 100 lb.)				
Heavy rails	$4.725	$4.725	$4.725	$4.45
Light rails	5.65	5.65	5.65	5.35
Semifinish Steel: (per net ton)				
Rerolling billets	$68.50	$68.50	$68.50	$64.00
Slabs, rerolling	68.50	68.50	68.50	64.00
Forging billets	84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	96.00	96.00	96.00	86.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.025¢	5.025¢	5.025¢	4.675¢
Skelp	4.225	4.225	4.225	3.90
Finished Steel Composite: (per pound)				
Base price	5.174¢	5.174¢	5.174¢	4.797¢

	Dec. 7 1955	Nov. 30 1955	Nov. 8 1955	Dec. 7 1954
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$63.69	$63.69	$63.69	$61.19
Foundry, Valley	59.00	59.00	59.00	56.50
Foundry, Southern, Cin'ti	62.93	62.93	62.93	60.43
Foundry, Birmingham	55.00	55.00	55.00	52.88
Foundry, Chicago	59.00	59.00	59.00	56.50
Basic, del'd Philadelphia	62.77	62.77	62.77	60.27
Basic, Valley furnace	58.50	58.50	58.50	56.00
Malleable, Chicago	59.00	59.00	59.00	56.50
Malleable, Valley	59.00	59.00	59.00	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	9.50¢
‡ 74.76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig Iron	$59.09	$59.09	$59.09	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$49.50	$48.00	$45.50	$32.50
No. 1 steel, Phila. area	49.50	48.50	46.50	31.50
No. 1 steel, Chicago	49.50	44.50	42.50	32.50
No. 1 bundles, Detroit	45.50	42.00	39.00	26.50
Low phos., Youngstown	54.50	49.50	49.00	35.50
No. 1 mach'y cast, Pittsburgh	54.50	52.50	50.50	42.50
No. 1 mach'y cast, Philadel'a	56.50	53.50	48.50	42.00
No. 1 mach'y cast, Chicago	56.50	54.50	53.50	43.00
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$49.50	$47.00	$44.83	$32.17
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.25	$14.25	$14.25	$14.38
Foundry coke, prompt	16.25	16.25	16.25	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	43.00	43.00	43.00	30.00
Copper, Lake, Conn.	43.00	43.00	43.00	30.00
Tin, Straits, New York	103.875	99.125	96.25	89.875
Zinc, East St. Louis	13.00	13.00	13.00	11.50
Lead, St. Louis	15.30	15.30	15.30	14.80
Aluminum, virgin ingot	24.40	24.40	24.40	22.20
Nickel, electrolytic	64.50	64.50	64.50	67.87
Magnesium, ingot	33.25	33.25	33.25	27.75
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite
Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 204→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	60.50	61.00	61.50	62.00	.....
Birdsboro, Pa. *B6*	60.50	61.00	61.50	62.00	.....
Birmingham *R3*	54.50	55.00*	.....	.....	.....
Birmingham *W9*	54.50	55.00*	59.00	.....	.....
Birmingham *U4*	54.50	55.00*	59.00	.....	.....
Buffalo *R3*	58.50	59.00	59.50	.....	.....
Buffalo *H1*	58.50	59.00	59.50	.....	.....
Buffalo *W6*	58.50	59.00	59.50	60.00	.....
Chester *C17*	60.50	61.00	61.50	.....	.....
Chicago *I4*	58.50	59.00	59.00	59.50	.....
Cleveland *A5*	58.50	59.00	59.00	59.50	63.50
Cleveland *R3*	58.50	59.00	59.00	.....	.....
Duluth *I4*	58.50	59.00	59.00	59.50	.....
Erie *I4*	58.50	59.00	59.00	59.50	.....
Everett *M6*	.....	62.50	63.00	.....	.....
Fontana *K1*	64.50	65.00	.....	.....	.....
Geneva, Utah *C7*	58.50	59.00	.....	.....	.....
Granite City *G2*	60.40	60.90	61.40	.....	.....
Hubbard *Y1*	.....	.....	59.00	.....	.....
Lone Star *L3*	.....	55.00	.....	.....	.....
Minnequa *C6*	60.50	61.00	61.50	.....	.....
Monessen *P6*	58.50	.....	.....	.....	.....
Neville Is. *P4*	58.50	59.00	59.00	.....	.....
N. Tonawanda *T1*	.....	59.00	59.50	.....	.....
Pittsburgh *U1*	58.50	.....	.....	59.50	.....
Sharpsville *S3*	58.50	59.00	59.00	59.50	.....
So. Chicago *R3*	58.50	.....	59.00	.....	.....
Steelton *B3*	60.50	61.00	61.50	62.00	66.50
Swedeland *A2*	60.50	61.00	61.50	62.00	.....
Toledo *I4*	58.50	59.00	59.00	59.50	.....
Troy, N. Y. *R3*	60.50	61.00	61.50	62.00	66.50
Youngstown *Y1*	.....	.....	59.00	59.50	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. *Add $1.00 for 0.31-0.69 pct phos

Silvery Iron: Buffalo, *H1*, $68.75; Jackson, *J1, G1*, $67.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	17.75	19.00	—	20.25	31.50	25.00	33.75	15.00	—	15.25
Slabs, billets, rerolling	22.25	24.75	26.75	26.00	40.25	32.00	43.00	19.50	—	19.75
Forg. discs, die blocks, rings	—	—	—	—	—	—	—	—	—	—
Billets, forging	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.00	25.00
Bars, wires, structurals	38.00	38.25	41.00	40.25	60.75	45.25	60.00	30.50	31.00	31.00
Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	33.00	32.25
Sheets	44.25	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75
Strip, hot-rolled	32.00	34.50	—	37.25	58.25	44.25	59.75	—	—	—
Strip, cold-rolled	41.00	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A5*; Butler, Pa., *A7*; McKeesport, Pa., *U1*; Washington, Pa., *W2, J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Ft. Wayne, *J4*; Philadelphia, *D5*.

Strip: Midland, Pa., *C11*; Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A5*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Middletown, O., *A7*; Harrison, N. J., *D3*; Youngstown, *C5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (.25¢ per lb higher); *W1* (.25¢ per lb higher); New Bedford, Mass., *R6*.

Bar: Baltimore, *A7*; Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1, F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A5*; Massillon, O., *R3*; Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A5*; Waukegan, *A5*; Canton, O., *T5*; Ft. Wayne, *I4*; Philadelphia, *D5*; Detroit, *R5*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A5*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A5*; Syracuse, *C11*.

Plates: Brackenridge, Pa., *A5*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Philadelphia, *D5*.

Forged discs, die blocks, rings: Pittsburgh, *C11*; Syracuse, *C11*; Ferndale, Mich., *A3*; Washington, Pa., *J2*.

Forgings billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*.

Prices Hit Record Heights

Steelmaking grades lead broad advance . . . Chicago list up as much as $5 . . . Prices rise in Pittsburgh, Detroit and the East . . . Composite at all-time high.

◆ THE SCRAP market has really broken loose. Prices are at an all-time high. Best steelmaking grades have hit $50 in Chicago, Pittsburgh and Philadelphia.

The market is moving forward solidly. Even in Pittsburgh, where activity has been lagging, broker buying confirmed market strength. Buffalo, Boston, Cleveland—every district reported gains.

Most spectacular advances came in Ohio, where prices moved up $4, and Chicago, where gains were as much as $5. Detroit reported steelmaking grades up $3.50. Only the West Coast was steady.

Reflecting general strength, THE IRON AGE Composite for No. 1 heavy melting advanced $2.50 to $49.50. It's never been higher but no one is saying a peak has been reached.

Pittsburgh . . . Despite the absence of any announced sales in the immediate area, broker bidding has pushed the openhearth scrap price up $2 a ton to $50 for No. 1 heavy melting; $44 for No. 2 heavy melting, and $40 for No. 2 bundles. Dealer scrap is getting very tight with many dealers out of the market until the first of the year. The balance are auctioning off scrap, a carload at a time, to the highest bidders. Low phos was up $2 a ton on the latest reported sale, and some brokers are not willing to sell at this price. The latest RR lists advanced prices as much as $4 a ton. Blast furnace grades also advanced on the latest sales and cast scrap prices continued their steady rise of the past month.

Chicago . . . Sweeping advances in factory list prices early last week were confirmed in a growing volume of new mill purchases by the week's end. The Chicago list moved up as much as $5 in nearly all grades. Even cast, which had been lagging slightly, tightened and advanced on new sales. With the new mill prices giving some relief, nonetheless the rapid price advance caught brokers with a heavy percentage of old orders still to be covered, in steelmaking and electric furnace grades. No. 2 dealer bundles were incorrectly listed in the issue of November 24, and should have been listed as $35-35.50.

Philadelphia . . . A new round of prices are reflected in this week's market, pushing top steelmaking grades up $1 on the average. Blast furnace grades are up $3, with low phos showing a $2 spurt over last week's list. Other advances were made in railroad specialties and the cast market. The upward spiral has pegged this market at an all-time high, and feeling among brokers and some dealers is that the end is not yet in sight.

New York . . . This market continues to surge ahead. On the basis of both domestic and export buying, steelmaking and blast furnace grades have advanced another $1 per ton. Cast scrap continues to be the hottest item with prices on most grades up $3 per ton as a result of new buying. Scrap men are slightly puzzled by the large orders again this week from a major mill in an adjacent consuming area for cast scrap.

Detroit . . . No. 1 grades advanced another $3.50 as a local mill bought the best steelmaking grades at $46 on track, continuing to reflect a growing amount of strength. Brokers and dealers find the present market conditions puzzling, but they expect the market to remain strong at least until the first of the year.

Cleveland . . . Valley market broke loose with $4 price jump this week to $53 on No. 1 heavy melting and Cleveland rose in sympathy. Special production scrap was going for $55 on fringes of district but secondary dealer grades were weak.

Birmingham . . . Steel mills in the district purchased limited amounts of scrap this week at increased prices. There is a strong bullish feeling in the market due to the scarcity of scrap due to cold weather and continued price rises in the export market. One mill blamed an announced increase in the price of its products to the increased cost of scrap. The cast market is generally healthy, which is unusual for this time of year because it is the off season for pipe manufacturers, the largest consumers. Several mills are buying at present prices, believing it a good idea to build inventories while cast is available in reasonable supply.

St. Louis . . . With an increase in demand from the steel mills as well as from electric furnaces and casting plants, nearly every item on the St. Louis list advanced during the week from $2 to $6. Demand from the last two groups has been dormant for some time and has now come sharply in competition with the steel mills for some items. The new prices were announced the latter part of the week for December. With the steel operating rate past 100 pct, shipments of scrap are consumed as fast as received.

Cincinnati . . . Both local and fringe mills placed orders last week at $3 higher or $48 delivered Cincinnati. Increased prices are expected to keep scrap in area unless Pittsburgh market booms beyond present range. Tonnage coming in on springboard this month is expected to drop materially since competing St. Louis market is getting stronger. One mill in area will soon start laying down additional tonnage for openhearths going into service in March.

Buffalo . . . Entry of area's biggest purchaser for tonnage quantities sent prices of steelmaking grades up $2. Prices of No. 1 machinery cast and cupola cast moved up $2 on scattered buying.

Boston . . . No. 1 heavy melting is up another dollar this week on brisk buying by eastern Pennsylvania mills. Export continues strong. Cast and blast furnace grades made scattered gains.

West Coast . . . There's renewed export activity in all major ports. But mills aren't worrying—there's enough scrap around and present prices are keeping the flow at an adequate pace. Cast scrap took a $5 jump in San Francisco, $3 in Los Angeles.


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PLANTS
OFFICES

Scrap Prices *(Effective Dec. 6, 1955)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	39.00 to 40.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and ma. turns.	31.00 to 32.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Low phos. punch'gs, plate	54.00 to 55.00
Heavy turnings	44.00 to 45.00
No. 1 RR. hvy. melting	53.00 to 54.00
Scrap rails, random lgth.	58.00 to 59.00
Rails 2 ft and under	63.00 to 64.00
RR. steel wheels	57.00 to 58.00
RR. spring steel	57.00 to 58.00
RR. couplers and knuckles	57.00 to 58.00
No. 1 machinery cast.	54.00 to 55.00
Cupola cast.	46.00 to 47.00
Heavy breakable cast.	44.00 to 45.00

Chicago

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 factory bundles	52.00 to 53.00
No. 1 dealers' bundles	49.00 to 50.00
No. 2 dealers' bundles	40.00 to 41.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. forge crops	59.00 to 60.00
Low phos. punch'gs plate	56.00 to 57.00
Low phos. 2 ft and under	55.00 to 56.00
No. 1 RR. hvy. melting	54.00 to 55.00
Scrap rails, random lgth.	64.00 to 65.00
Rerolling rails	74.00 to 75.00
Rails 2 ft and under	69.00 to 70.00
Locomotive tires, cut	58.00 to 59.00
Cut bolsters & side frames	59.00 to 60.00
Angles and splice bars	66.00 to 67.00
RR. steel car axles	66.00 to 67.00
RR. couplers and knuckles	59.00 to 60.00
No. 1 machinery cast.	56.00 to 57.00
Cupola cast.	52.00 to 53.00
Heavy breakable cast.	44.00 to 45.00
Cast iron brake shoes	41.00 to 42.00
Cast iron car wheels	50.00 to 51.00
Malleable	63.00 to 64.00
Stove plate	43.00 to 44.00

Philadelphia Area

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	41.00 to 42.00
Machine shop turn.	34.00 to 35.00
Mixed bor. short turn.	34.00 to 35.00
Cast iron borings	34.00 to 35.00
Shoveling turnings	37.00 to 38.00
Clean cast chem. borings	35.00 to 36.00
Low phos. 5 ft and under	52.00 to 53.00
Low phos. 2 ft and under	53.00 to 54.00
Low phos. punch'gs	53.00 to 54.00
Elec. furnace bundles	51.00 to 52.00
Heavy turnings	45.00 to 46.00
RR. steel wheels	54.00 to 55.00
RR. spring steel	54.00 to 55.00
Rails 18 in. and under	62.00 to 63.00
Cupola cast.	49.50 to 50.50
Heavy breakable cast.	51.00 to 52.00
Cast iron car wheels	55.00 to 56.00
Malleable	61.50 to 62.50
Unstripped motor blocks	36.00 to 37.00
No. 1 machinery cast.	56.00 to 57.00

Cleveland

No. 1 hvy. melting	$49.50 to $50.50
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles	49.50 to 50.50
No. 2 bundles	38.00 to 39.00
No. 1 busheling	49.50 to 50.50
Machine shop turn.	26.00 to 27.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	30.00 to 31.00
Cut struct'r'l & plates, 2 ft & under	54.00 to 55.00
Drop forge flashings	49.50 to 50.50
Low phos. punch'gs, plate	51.00 to 52.00
Foundry steel, 2 ft & under	50.00 to 51.00
No. 1 RR. heavy melting	52.00 to 53.00
Rails 2 ft and under	66.00 to 67.00
Rails 18 in. and under	67.00 to 68.00
Railroad grate bars	40.00 to 41.00
Steel axle turnings	34.00 to 35.00
Railroad cast.	52.00 to 53.00
No. 1 machinery cast.	51.00 to 52.00
Stove plate	49.00 to 50.00
Malleable	55.00 to 56.00

Youngstown

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	52.00 to 53.00
No. 2 bundles	39.00 to 40.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. plate	54.00 to 55.00

Buffalo

No. 1 hvy. melting	$43.00 to $44.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 busheling	43.00 to 44.00
No. 1 bundles	43.00 to 44.00
No. 2 bundles	32.00 to 33.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. plate	46.00 to 47.00
Scrap rails, random lgth.	47.00 to 48.00
Rails 2 ft and under	54.00 to 55.00
RR. steel wheels	48.00 to 49.00
RR. spring steel	48.00 to 49.00
RR. couplers and knuckles	48.00 to 49.00
No. 1 machinery cast.	45.00 to 46.00
No. 1 cupola cast.	42.00 to 43.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$45.00 to $46.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles, openhearth	45.00 to 46.00
No. 2 bundles	31.00 to 32.00
New busheling	45.00 to 46.00
Drop forge flashings	44.50 to 45.00
Machine shop turn.	21.00 to 22.00
Mixed bor. and turn.	24.00 to 25.00
Shoveling turnings	24.00 to 25.00
Cast iron borings	34.00 to 35.00
Low phos. punch'gs, plate	45.00 to 46.00
No. 1 cupola cast.	42.00 to 43.00
Heavy breakable cast.	36.00 to 37.00
Stove plate	37.00 to 38.00
Automotive cast.	45.00 to 46.00

St. Louis

No. 1 hvy. melting	$41.50 to $42.50
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	44.00 to 45.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	29.00 to 30.00
Cast iron borings	31.00 to 32.00
Shoveling turnings	29.00 to 30.00
No. 1 RR. hvy. melting	50.50 to 51.50
Rails, random lengths	58.00 to 59.00
Rails, 18 in. and under	63.00 to 64.00
Locomotive tires uncut	57.00 to 58.00
Angles and splice bars	57.00 to 58.00
Std. steel car axles	57.00 to 58.00
RR. specialties	57.00 to 58.00
Cupola cast.	50.00 to 51.00
Heavy breakable cast.	38.00 to 39.00
Cast iron brake shoes	40.00 to 41.00
Stove plate	41.00 to 42.00
Cast iron car wheels	48.00 to 49.00
Rerolling rails	69.00 to 70.00
Malleable	48.00 to 49.00
Unstripped motor blocks	40.00 to 41.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	33.00 to 33.50
No. 1 bundles	28.00 to 29.00
No. 2 bundles	29.00 to 29.50
No. 1 busheling	38.00 to 39.00
Elec. furnace, 2 ft & under	39.00 to 40.00
Machine shop turn.	23.00 to 23.50
Mixed bor. and short turn.	23.00 to 24.00
Shoveling turnings	24.00 to 25.00
Clean cast chem. borings	24.00 to 25.00
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	35.00 to 36.00
Heavy breakable cast.	37.00 to 38.00
Stove plate	34.00 to 35.00
Unstripped motor blocks	19.00 to 20.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$44.50 to $45.50
No. 2 hvy. melting	39.00 to 40.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	22.00 to 23.00
Mixed bor. and turn.	24.00 to 25.00
Shoveling turnings	25.00 to 26.00
Clean cast chem. borings	25.00 to 26.00
No. 1 machinery cast.	44.00 to 45.00
Mixed yard cast.	43.00 to 44.00
Charging box cast.	44.00 to 45.00
Heavy breakable cast.	44.00 to 45.00
Unstripped motor blocks	29.00 to 30.00

Birmingham

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	30.00 to 31.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	18.00 to 19.00
Electric furnace bundles	47.00 to 48.00
Bar crops and plate	50.00 to 51.00
Structural and plate, 2 ft	49.00 to 50.00
No. 1 RR. hvy. melting	46.00 to 47.00
Scrap rails, random lgth.	55.00 to 56.00
Rails, 18 in. and under	61.00 to 62.00
Angles & splice bars	57.00 to 58.00
Rerolling rails	62.00 to 63.00
No. 1 cupola cast.	47.50 to 48.50
Stove plate	44.50 to 45.50
Charging box cast.	30.00 to 31.00
Cast iron car wheels	38.00 to 39.00
Unstripped motor blocks	36.00 to 37.00
Mashed tin cans	15.00 to 16.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$45.00 to $46.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	36.00 to 37.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. 18 in. & under	52.00 to 53.00
Rails, random lengths	55.00 to 56.00
Rails, 18 in. and under	62.00 to 63.00
No. 1 cupola cast.	44.00 to 45.00
Hvy. breakable cast.	42.00 to 43.00
Drop broken cast.	52.00 to 53.00

San Francisco

No. 1 hvy. melting	$39.00
No. 2 hvy. melting	37.00
No. 1 bundles	39.00
No. 2 bundles	33.00
No. 3 bundles	29.00
Machine shop turn.	18.00
Cast iron borings	18.00
No. 1 RR. hvy. melting	39.00
No. 1 cupola cast.	50.00

Los Angeles

No. 1 hvy. melting	$39.00
No. 2 hvy. melting	37.00
No. 1 bundles	39.00
No. 2 bundles	33.00
No. 3 bundles	29.00
Machine shop turn.	18.00
Shoveling turnings	21.00
Cast iron borings	18.00
Elec. furn. 1 ft and under	39.00
No. 1 RR. hvy. melting	39.00
No. 1 cupola cast.	48.00

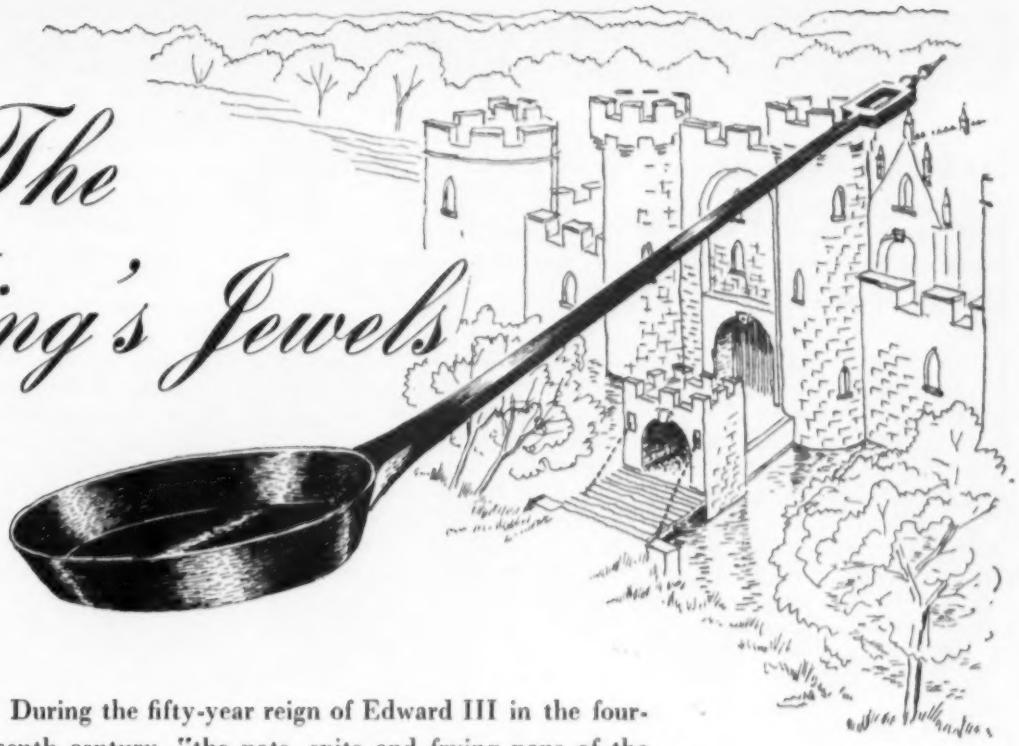
Seattle

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 2 bundles	34.00
No. 3 bundles	30.00
No. 1 cupola cast.	40.00
Mixed yard cast.	40.00

Hamilton, Ont.

No. 1 hvy. melting	$38.50
No. 2 hvy. melting	35.50
No. 1 bundles	38.50
No. 2 bundles	32.50
Mixed steel scrap	32.50
Bushelings	33.50
Bush., new fact. prep'd	36.50
Bush., new fact. unprep'd	32.50
Machine shop turn.	16.00
Short steel turn.	25.50
Mixed bor. and turn.	$16.00 to 17.00
Rails, rerolling	47.50
Cast scrap	42.00 to 45.00

The King's Jewels



During the fifty-year reign of Edward III in the fourteenth century, "the pots, spits and frying pans of the royal kitchen were classed among the king's jewels"... In 1645, at Lynn, Mass., a one-quart kettle, the first iron casting made in America, was given to Thomas Hudson, younger brother of Hendrik Hudson, as part consideration for sixty acres of land.

Today, cooking utensils may not be so highly valued, but they represent one of the thousands of indispensable demands upon iron and steel production—for civilian and military requirements. . . . To assure a continuity of this production, a constant supply of scrap must be maintained.

For the purchase or sale of iron or steel scrap...

phone or write "Your Chicago Broker"

M.S. KAPLAN COMPANY

231 S. La Salle St., Chicago

Telephone ANdover 3-3900

Gray Market in Nickel

Electroplaters claim 70 pct of their supply costs four times the established price . . . RETMA asks Commerce Dept. for action . . . Imports up 10 pct.

◆ THE NICKEL MARKET, tight for some time, has reached the point where it threatens to boil over. There are strong indications that a "gray" market has managed to get more than a foot in the door.

A spokesman for the electroplating industry says the "gray" market is supplying many plating companies with as much as 70 pct of their requirements, in some cases at prices ranging as high as 400 pct over the legitimate producers' price. And even paying over scale prices has not solved the supply situation. Most platers are operating at considerably below capacity and at least one working on automotive parts declares he is forced to operate under 70 pct of capacity.

Highlights Shortage

The Radio-Electronics-Television Manufacturers Association has indicated the nickel shortage for receiving tubes is so critical that they will petition the Commerce Dept. for immediate action. In anticipation of possible government action aimed at boosting nickel for defense production only, RETMA president H. Leslie Hoffman says this would not be the answer since it is impossible to identify nickel for defense uses early enough in the processing.

Thus far there is no evidence of a strong "gray" market in this field though some of the smaller and medium sized manufacturers are quietly paying premium prices in order to get the nickel necessary to meet contract stipulations.

An industrial materials advisor for the Commerce Dept. has said that he will not recommend extreme government action. He considers the magnitude of the reported "gray" market exaggerated. He also considers current methods of nickel allocations equitable.

Metallurgical sources outside the plating and electronics industries indicate knowledge of the existence of a "gray" market but claim that thus far they have not been forced to pay the higher prices. They disagree with the Commerce Dept. representative in that they generally admit that the platers especially are short changed on nickel allotments.

Just exactly what will happen no one seems to know. Imports for September, the latest month calculated, rose 10 pct.

Other countries are feeling the squeeze and are bidding for more nickel. France has removed the eight pct import duty for nickel. Price in the British open market is twice as high as a year ago and four times the price charged by International Nickel of Canada, her biggest supplier. Thus any substantial increase in imports is not likely despite a steady increase in world production, this year of 12,000 tons.

Most likely are suspension temporarily of government stockpile deliveries and some release from the stockpile. Even this will not be adequate unless demand eases.

COPPER . . . Things are fairly quiet on the copper front. Everyone seems to be waiting for outcome of the threatened strike of Chilean workers. Ever since the U. S. subsidiaries mining copper in Chile landed a more equitable exchange rate saving them money, workers' union has been agitating to have the labor section of the Chilean copper law rewritten to permit them to get what they think is their share of the copper companies' gain. Chile has sided with the producers and has turned down at least one prospective amendment. Actually, though the unions sound off loud and clear, there is little chance that they will inhibit production for very long even if they do attempt to strike. Chilean President Ibanez has already declared that possible amendments for the law are under consideration and that any strike would be illegal. He is well aware of the fact that the higher price for copper has permitted his government to reduce the deficit in its foreign exchange budget from an estimated $130 million to only $30 million. He will keep the workers in line, by force if necessary, in order to get the maximum benefit from the currently overpriced copper.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in November based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper		Straits tin, New York	99.053
Del'd Conn. Valley	43.00	Zinc, E. St. Louis	13.00
Lake copper, delivered	43.00	Lead, St. Louis	15.30

Note: Quotations are going prices

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Nov. 30	Dec. 1	Dec. 2	Dec. 3	Dec. 5	Dec. 6
Copper, electro, Conn.	43.00	43.00	43.00	....	43.00	43.00
Copper, Lake, delivered	43.00	43.00	43.00	....	43.00	43.00
Tin, Straits, New York	99.75	100.125	100.875	102.25	103.75	103.875*
Zinc, East St. Louis	13.00	13.00	13.00	13.00	13.00	13.00
Lead, St. Louis	15.30	15.30	15.30	15.30	15.30	15.30

Note: Quotations are going prices **Tentative*



He told us he was glad to find

A BRASS MILL WITHOUT "Brass"

He's the head of a good-sized metal fabricating outfit, and he wears the same size hat he always did. He's a shirt-sleeved working man, just like us, so when he called with his order, we spoke the same language . . . the direct, debunked language that leads to *action, right now.*

He found that the first man he talked to, here, had *both* mill and sales experience, and that he didn't ever have to backtrack over details with anyone else. When he asked if this man was one of "The Brass", we told him we didn't have any "Brass" of that kind . . . just a well-coordinated group of experienced, responsible people with the know-how and authority to see an order through *fast and right.*

We make many good friends this way . . . among people who want their Brass strip, rod and wire exactly how and when they want it! If you talk that language, too, then call Bristol, Connecticut, Ludlow 2-3161 . . . and you'll see what we mean by "*Bristol-Fashion*".

THE BRISTOL BRASS CORPORATION

has been making Brass strip, rod and wire here in Bristol, Connecticut since 1850, and has offices and warehouses in Albany, Boston, Buffalo, Chicago, Cleveland, Detroit, Milwaukee, New York, Philadelphia, Providence, Rochester, Syracuse. The Bristol Brass Corporation of California, 1217 East 6th St., Los Angeles 21. The Bristol Brass Corporation of Ohio, 1607 Broadway, Dayton.

"*Bristol-Fashion*" means **Brass at its Best**

Nonferrous Prices *(Effective Dec. 6, 1955)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 20,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136–.249	.250–3.
1100, 3003	40.8	38.7	37.5	36.5
5052	48.3	43.4	41.7	39.9
6061-0	45.4	41.2	39.4	39.3

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6–8	41.6–43.3	56.6–60.2
12–14	42.3–43.7	57.5–61.8
24–26	45.3–45.7	67.7–72.1
36–38	53.6–54.2	90.5–94.3

Screw Machine Stock—2011-T-3

Size*	⅛	9/64–⅜	7/16–1	1¼–1½
Price	54.5	53.4	52.1	50.1

Roofing Sheet, Corrugated

(Per sheet, 26" wide, base, 16,000 lb)

Length* →	72	96	120	144
.019 gage	$1.295	$1.727	$2.160	$2.590
.024 gage	1.615	2.162	2.692	3.232

Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: FS1-O ¼ in., 61¢; 3/16 in., 62¢; ½ in., 61¢; 0.064 in., 78¢; 0.032 in., 99¢. Specification grade higher. Base, 30,000 lb.

Extruded Round Rod: FS, diam ¼ to 0.311 in., 82.5¢; ⅜ to ⅝ in., 65¢; 1¼ to 1.749 in., 60.5¢; 2½ to 5 in., 57¢. Other alloys higher. Base up to ⅝ diam, 10,000 lb; ⅝ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: FS. In weight per ft for perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 70.7¢; 0.22 to 0.25 lb, 5.5 in., 66.9¢; 0.50 to 0.59 lb, 8.6 in., 63¢; 1.8 to 2.59 lb, 19.5 in., 60.8¢; 4 to 6 lb, 28 in., 57.7¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: FS, 0.049 to 0.057 in. wall thickness: OD ¼ to 5/16 in., $1.625; 5/16 to ⅝ in., $1.475; ½ to ¾ in., $1.105; 1 to 2 in., 92.5¢; 0.165 to 0.219 in. wall: OD ⅝ to ¾ in., 75.5¢; 1 to 2 in., 71.5¢; 3 to 4 in., 70.5¢. Other alloys higher. Base OD: Up to 1½ in., 10,000 lb; 1½ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	63.13	....	63.48
Copper, h-r	58.76	59.11	....
Copper, drawn	....	60.36	....
Low brass	56.55	56.49	....
Yellow brass	52.27	52.21	....
Red brass	58.09	58.03	....
Naval brass	52.83	49.94	48.40
Leaded brass	....	....	48.42
Com. bronze	60.18	60.12	....
Mang. bronze	59.39	53.38	54.94
Phos. bronze	81.00	81.50	....
Munts metal	53.74	49.55	50.80
Ni silver, 10 pct	66.00	65.32	70.68

Beryllium copper, CR, 1.9% Be, Base 2000 lb, f.o.b.

Strip	$1.84
Rod, bar, wire	1.81

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	102	83	99
Strip, CR	102	92	125
Rod, Bar, HR	87	74	93
Angles, HR	87	74	93
Plate, HR	97	87	95
Seamless Tube	122	110	153
Shot, Blocks	....	71	....

Titanium

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $13.10-$13.60; alloy $15.25-$15.75; Plate, HR, commercially pure, $10.50-$11.00; alloy, $11.50-$12.00. Wire, rolled and/or drawn, commercially pure, $9.50-$11.50; alloy, $11.50; Bar, HR or forged, commercially pure, $7.90-$8.15; alloy, $7.90-$8.10.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	24.40
Aluminum pig	22.50
Antimony, American, Laredo, Tex.	33.50
Beryllium copper, per lb cont'd Be	$43.00
Beryllium aluminum 5% Be, Dollars per lb contained Be	$72.75
Bismuth, ton lots	$2.25
Cadmium, del'd	$1.70
Cobalt, 97-99% (per lb)	$2.60 to $2.67
Copper, electro, Conn. Valley	43.00
Copper, Lake, delivered	43.00
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$100 to $120
Lead, St. Louis	15.30
Lead, New York	15.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig	32.50
ingot	33.25
Magnesium, sticks, 100 to 500 lb	53.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$280 to $285
Nickel electro	64.50
Nickel oxide sinter at Copper Cliff, Ont., contained nickel	60.75
Palladium, dollars per troy oz.	$22.20 to $24
Platinum, dollars per troy oz.	$97 to $99
Silver, New York, cents per troy oz.	91.00
Tin, New York	103.875*
Titanium sponge, grade A-1	$3.45
Zinc, East St. Louis	13.00
Zinc, New York	13.50
Zirconium, sponge	$10.00

* Tentative

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot	
No. 115	42.00
No. 120	41.25
No. 123	40.50
80-10-10 ingot	
No. 305	45.75
No. 315	44.00
88-10-2 ingot	
No. 210	58.25
No. 215	54.75
No. 245	48.75
Yellow ingot	
No. 405	33.25
Manganese bronze	
No. 421	37.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	32.00-32.75
0.60 copper max.	31.75-32.50
Piston alloys (No. 122 type)	31.50-32.50
No. 12 alum. (No. 2 grade)	30.00-30.75
108 alloy	30.50-31.00
195 alloy	32.00-32.75
13 alloy (0.60 copper max.)	31.75-32.50
AXS-679	30.50-31.00

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½%	31.00-32.00
Grade 2—92-95%	30.00-31.00
Grade 3—90-92%	29.00-30.00
Grade 4—85-90%	28.00-28.75

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	39	38¼
Yellow brass	28⅞	26⅝
Red brass	34¼	33⅛
Comm. bronze	35⅝	35
Mang. bronze	27	25⅝
Yellow brass rod ends	28⅝	

Custom Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	41
No. 2 copper wire	39½
Light copper	37¼
*Refinery brass	36

* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	41
No. 2 copper wire	39½
Light copper	37¼
No. 1 composition	34
No. 1 comp. turnings	33⅛
Hvy. yellow brass solids	23
Brass pipe	27⅛
Radiators	26½

Aluminum

Mixed old cast.	20 —21½
Mixed new clips	21½—22½
Mixed turnings, dry	20½—22

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	38 —38½
No. 2 heavy copper and wire	36½—37
Light copper	34 —34½
New type shell cuttings	33½—34
Auto radiators (unsweated)	23 —23½
No. 1 composition	30½—31
No. 1 composition turnings	28½—29
Unlined red car boxes	23½—24
Cocks and faucets	24 —24½
Clean heavy yellow brass	19½—20
Brass pipe	24½—25
New soft brass clippings	24½—25
No. 1 brass rod turnings	22½—23

Aluminum

Alum. pistons and struts	16½—17
Aluminum crankcases	16¾—17⅛
1100 (2S) aluminum clippings	19½
Old sheet and utensils	16¾—17⅛
Borings and turnings	11 —11½
Industrial castings	16¾—17⅛
2024 (24s) clippings	18 —18⅛

Zinc

New zinc clippings	8 — 8⅛
Old zinc	5½— 6
Zinc routings	4
Old die cast scrap	3½

Nickel and Monel

Pure nickel clippings	$1.25
Clean nickel turnings	$1.00
Nickel anodes	$1.25
Nickel rod ends	$1.25
New Monel clippings	54½
Clean Monel turnings	44
Old sheet Monel	50
Nickel silver clippings, mixed	23
Nickel silver turnings, mixed	19

Lead

Soft scrap lead	12 —12½
Battery plates (dry)	6½— 6⅝
Batteries, acid free	4¼

Magnesium

Segregated solids	18½—19
Castings	17½—18

Miscellaneous

Block tin	80 —81
No. 1 pewter	63 —64
Auto babbitt	42 —43
Mixed common babbitt	14½
Solder joints	19½—20
Siphon tops	43
Small foundry type	16½
Monotype	15
Lino. and stereotype	14 —14¼
Electrotype	13 —13½
Hand picked type shells	10½—11
Lino. and stereo. dross	6
Electro. dross	5

IRON AGE

STEEL PRICES

(Effective Dec. 6, 1955)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$96.00 *B3*		4.65 *B3*	6.80 *B3*	4.65 *B3*						
	Buffalo, N. Y.	$68.50 *B3*	$84.50 *R3, B3*	$96.00 *R3, B3*	5.45 *B3*	4.65 *B3*	6.80 *B3*	4.65 *B3*	4.325 *R3,B3*	6.25 *B3* 6.25 *R7,S10,*	6.425 *B3*	9.10 *B3*		
	Claymont, Del.													13.45 *C11*
	Harrison, N. J.													
	Conshohocken, Pa.								4.375 *A2*	6.30 *A2*	6.425 *A2*			
	New Bedford, Mass.									6.70 *R6*				
	Johnstown, Pa.	$68.50 *B3*	$84.50 *B3*	$96.00 *B3*		4.65 *B3*	6.80 *B3*							
	Boston, Mass.									6.80 *T8*				13.80 *T8*
	New Haven, Conn.									6.70 *D1 A5*				
	Phoenixville, Pa.					5.15 *P2*		5.15 *P2*						
	Sparrows Pt., Md.								4.325 *B3*	6.25 *B3*	6.425 *B3*	9.10 *B3*		
	Bridgeport, Wallingford, Conn.	$73.50 *N8*	$89.50 *N8*						4.625 *N8*	6.70 *W1*			7.50 *N8*	
	Pawtucket, R. I. Worcester, Mass.									6.80 *N7 A5*				*A5* 13.80 *N7*
MIDDLE WEST	Alton, Ill.								4.50 *L1*					
	Ashland, Ky.								4.325 *A7*					
	Canton-Massillon, Dover, Ohio		$86.50 *R3*	$96.00 *R3*										13.45 *G4*
	Chicago, Ill.	$68.50 *U1*	$84.50 *R3, U1,W8*	$96.00 *R3, U1,W8*	5.45 *U1*	4.60 *U1, W8*	6.75 *U1, Y1*	4.60 *U1*	4.55 *A1* 4.325 *N4,W8*	6.35 *A1,T8*			7.20 *W8*	13.45 *T8*
	Cleveland, Ohio									6.25 *A5,J3*		9.30 *A5*		13.45 *A5*
	Detroit, Mich.			$96.00 *R5*					4.425 *G3,M2*	6.35 *D1,D2, G3,M2,P11*	6.525 *G3*	9.20 *D2, G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$68.50 *U1*	$84.50 *U1*	$96.00 *U1, Y1*	5.45 *I3*	4.60 *U1, I3*	6.75 *U1, I3*		4.325 *I3, U1,Y1*	6.35 *I3* 6.25 *Y1*	6.425 *I3, U1,Y1*	9.30 *Y1*	7.20 *Y1, U1*	8.40
	Sterling, Ill.								4.425 *N4*					
	Indianapolis, Ind.									6.40 *C5*				
	Newport, Ky.												7.20 *N5*	
	Middletown, Ohio									6.45 *A7*				
	Niles, Warren, Ohio Sharon, Pa.	$68.50 *C10*	$84.50 *C10*	$96.00 *C10*					4.325 *S1, R3*	6.25 *S1, R3,T4*	6.425 *S1, R3*	9.10 *S1, R3*	7.20 *S1*	13.45 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$68.50 *U1, J3*	$84.50 *J3, U1,C11*	$96.00 *U1, C11*	5.45 *U1*	4.60 *U1, J3*	6.75 *U1, J3*	4.60 *U1*	4.325 *P6*	6.25 *S7,B4*			7.20 *S9*	13.45 *S9*
	Portsmouth, Ohio								4.325 *P7*	6.25 *P7*				
	Weirton, Wheeling, Follansbee, W. Va.					4.60 *W3*			4.325 *W3*	6.25 *F3,W3*	6.425 *W3*	9.10 *W3*		
	Youngstown, Ohio		$84.50 *C10*	$96.00 *Y1, C10*		4.60 *Y1*	6.75 *Y1*		4.325 *U1, Y1*	6.25 *Y1,C5*	6.425 *U1, Y1*	9.30 *Y1*	7.20 *U1, Y1*	13.45 *C5*
WEST	Fontana, Cal.	$76.00 *K1*	$92.00 *K1*	$115.00 *K1*		5.25 *K1*	7.40 *K1*	5.40 *K1*	5.075 *K1*	8.00 *K1*	7.525 *K1*		8.85 *K1*	
	Geneva, Utah		$84.50 *C7*			4.60 *C7*	6.75 *C7*							
	Kansas City, Mo.					4.70 *S2*	6.85 *S2*				6.875 *S2*		7.45 *S2*	
	Los Angeles, Torrance, Cal.		$94.00 *B2*	$116.00 *B2*		5.30 *C7, B2*	7.45 *B2*		5.075 *C7, B2*	8.30 *C1*			8.40 *B2*	
	Minnequa, Colo.					4.90 *C6*			5.425 *C6*					
	Portland, Ore.					5.35 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$94.00 *B2*			5.25 *B2, P9*	7.40 *B2*		5.075 *B2, C7*					
	Seattle, Wash.		$98.00 *B2*			5.35 *B2*	7.50 *B2*		5.325 *B2*					
SOUTH	Atlanta, Ga.								4.525 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$68.50 *T2*	$84.50 *T2*			5.10 *C16,* 4.60 *R3,T2*	6.75 *T2*		4.325 *R3,T2* 4.825 *C16*		6.425 *T2*			
	Houston, Lone Star, Tex.	$74.50 *L3*	$89.50 *S2*	$101.00 *S2*		4.70 *S2*	6.85 *S2*				6.675 *S2*		7.45 *S2*	

IRON AGE

STEEL PRICES

(Effective Dec. 6, 1955)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized *10* ga.	Enameling *12* ga.	Long Terne *10* ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes° *1.25*-lb. base box	Electro° *0.25*-lb. base box	Hollowware Enameling *29* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.325 *B3*	5.325 *B3*				6.375 *B3*	7.875 *B3*			*W6*	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb. coke base box. ° COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb.-0.25 lb. add 65¢.		
	Claymont, Del.													
	Conshohocken, Pa.													
	Coatesville, Pa.	4.375 *A2*	5.375 *A2*				6.425 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.025 *B3*			
	Fairless, Pa.	4.375 *U1*	5.375 *U1*				6.425 *U1*	7.925 *U1*				$9.30 *U1*	$8.00 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.325 *B3*	5.325 *B3*	5.85 *B3*			6.375 *B3*	7.875 *B3*	8.60 *B3*		5.125 *B3*	$9.30 *B3*	$8.00 *B3*	
	Worcester, Mass.										5.325 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										5.20 *L1*			
	Ashland, Ky.	4.325 *A7*		5.85 *A7*	5.90 *A7*									
	Canton-Massillon, Dover, Ohio			5.85 *R1, R3*										
	Chicago, Joliet, Ill.	4.55 *A1* 4.325 *W8*					6.375 *U1*				5.025 *A5, N4, R3*			
	Sterling, Ill.										5.125 *N4*			
	Cleveland, Ohio	4.325 *J3, R3*	5.325 *J3, R3*		5.90 *R3*		6.375 *J3, R3*	7.875 *J3, R3*			5.025 *A5*			
	Detroit, Mich.	4.425 *G3, M2*	5.425 *G3* 5.325 *M2*				6.475 *G3*	7.975 *G3*						
	Newport, Ky.	4.325 *N5*	5.325 *N5*	5.85 *N5*										
	Gary, Ind. Harbor, Indiana	4.325 *I3, U1, Y1*	5.325 *I3, U1, Y1*	5.85 *U1, I3*	5.90 *U1, I3*	6.25 *U1*	6.375 *Y1, U1, I3*	7.875 *U1, Y1*			5.025 *Y1*	$9.20 *I3, U1, Y1*	$7.90 *I3, U1, Y1*	6.65 *U1, Y1*
	Granite City, Ill.	4.525 *G2*	5.525 *G2*	6.05 *G2*	6.10 *G2*								$8.00 *G2*	6.75 *G2*
	Kokomo, Ind.	4.425 *C9*		5.95 *C9*						5.475 *C9*	5.125 *C9*			
	Mansfield, Ohio	4.325 *E2*	5.325 *E2*			6.25 *E2*				*E2*				
	Middletown, Ohio		5.325 *A7*	5.85 *A7*	5.90 *A7*	6.25 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.325 *S1, R3, N3*	5.325 *R3, N3*	5.85 *R3* 6.65 *N3*	5.90 *N3*	6.25 *N3*	6.375 *S1, R3*	7.875 *R3*				$9.20 *R3*	$7.90 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 *J3, U1, P6*	5.325 *J3, U1, P6*	5.85 *U1*	5.90 *U1, A7*		6.375 *J3, U1*	7.875 *U1*	8.60 *U1*		5.025 *A5, P6*	$9.20 *J3, U1*	$7.90 *J3, U1*	6.65 *U1*
	Portsmouth, Ohio	4.325 *P7*	5.325 *P7*								5.025 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.325 *W3, W5*	5.325 *W3, W5, F3*	5.85 *W3, W5*		6.25 *W3, W5*	6.375 *W3*	7.875 *W3*				$9.20 *W3, W5*	$7.90 *W3, W5*	6.65 *F3, W5*
	Youngstown, Ohio	4.325 *U1, Y1*	5.325 *Y1*		5.90 *Y1*		6.375 *U1, Y1*	7.875 *Y1*			5.025 *Y1*			
WEST	Fontana, Cal.	5.075 *K1*	6.425 *K1*				7.125 *K1*	8.975 *K1*						
	Geneva, Utah	4.425 *C7*												
	Kansas City, Mo.										5.275 *S2*			
	Los Angeles, Torrance, Cal.										5.625 *B2*			
	Minnequa, Colo.										5.275 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.025 *C7*	6.275 *C7*	6.60 *C7*							5.675 *C7*	$9.95 *C7*	$8.65 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.325 *R1, T2*	5.325 *T2*	5.85 *R1, T2*			6.375 *T2*			5.625 *R1*	5.025 *R1, T2*	$9.30 *T2*	$8.00 *T2*	
	Houston, Tex.										5.275 *S2*			

IRON AGE

STEEL PRICES

(Effective Dec. 6, 1955)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				5.575 *B3*	7.425 *B3*	6.80 *B3*					
	Buffalo, N. Y.	4.65 *B3,R3*	4.65 *B3,R3*	5.95 *B5*	5.575 *B3,R3*	7.425 *B3,B5*	6.80 *B3*	4.50 *B3,R3*				6.25 *W6*
	Claymont, Del.							4.80 *C4*		6.30 *C4*	6.725 *C4*	
	Coatesville, Pa.							4.80 *L4*		6.30 *L4*	6.725 *L4*	
	Conshohocken, Pa.							4.50 *A2*	5.575 *A2*		6.725 *A2*	
	Harrisburg, Pa.							5.10 *C3*	5.575 *C3*			
	Hartford, Conn.			6.40 *R3*		7.725 *R3*						
	Johnstown, Pa.	4.65 *B3*	4.65 *B3*		5.575 *B3*		6.80 *B3*	4.50 *B3*		6.30 *B3*	6.725 *B3*	6.25 *B3*
	Fairless, Pa.	4.80 *U1*	4.80 *U1*		5.725 *U1*							
	Newark, N. J.			6.35 *W10*		7.60 *W10*						
	Camden, N. J.			6.35 *P10*								
	Bridgeport, Putnam, Conn.	4.80 *N8*		6.45 *W10*	5.725 *N8*			4.750 *N8*				
	Sparrows Pt., Md.		4.65 *B3*					4.50 *B3*		6.30 *B3*	6.725 *B3*	6.35 *B3*
	Palmer, Worcester, Readville, Mass.			6.35 *W11* 6.45 *B5,C14*		7.725 *A5,B5*		4.50 *R3*				6.55 *A5, W6*
	Spring City, Pa.			6.35 *K4*		7.60 *K4*						
MIDDLE WEST	Alton, Ill.	4.85 *L1*										6.425 *L1*
	Ashland, Newport, Ky.							4.50 *A7,N5*		6.30 *N5*		
	Canton-Massillon, Mansfield, Ohio	4.75 *R3*		5.90 *R2,R3*	5.575 *R3,T5*	7.425 *R2,R3, T5*		4.50 *E2*				
	Chicago, Joliet, Ill.	4.65 *U1, N4,W8,R3, P13*	4.65 *N4,R3, P13*	5.90 *A5,W10, W8,B5,L2*	5.575 *U1,R3, W8*	7.425 *A5,W8, W10,L2,B5*		4.50 *U1,W8, I3,A1,R3*	5.575 *U1*	6.30 *U1*	6.725 *U1*	6.25 *A5,R3, N4,W7*
	Cleveland, Ohio	4.65 *R3*	4.65 *R3*	5.90 *A5,C13*		7.425 *A5,C13*	6.80 *R3*	4.60 *J3,R3*	5.575 *J3*		6.725 *R3,J3*	6.25 *A5, C13*
	Detroit, Mich.	4.75 *G3*	4.75 *G3*	5.90 *R5* 6.10 *B5,P8* 6.15 *P3*	5.575 *R5* 5.675 *G3*	7.425 *R5* 7.625 *B5,P3 P8*	6.90 *G3*	4.60 *G3*			6.825 *G3*	
	Duluth, Minn.											6.25 *A5*
	Gary, Ind. Harbor, Crawfordsville	4.65 *I3, U1, Y1*	4.65 *I3, U1, Y1*	5.90 *M5,R3*	5.575 *I3, U1, Y1*	7.425 *M5, R3*	6.80 *U1,I3, Y1*	4.50 *I3, U1,Y1*	5.575 *I3*	6.30 *U1,Y1*	6.725 *U1, I3,Y1*	6.35 *M4*
	Granite City, Ill.							4.70 *G2*				
	Kokomo, Ind.											6.35 *C9*
	Sterling, Ill.	4.75 *N4*	4.75 *N4*									6.35 *N4*
	Niles, Warren, Ohio Sharon, Pa.	4.65 *R3,C10*		5.90 *C10*	5.575 *C10*	7.425 *C10*	6.80 *R3*	4.50 *S1,R3*		6.30 *S1*	6.725 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.65 *J3, U1, C11*	4.65 *J3, U1*	5.90 *A5,C8, C11,J3, W10,B4,R3*	5.575 *U1,C11*	7.425 *A5,C11, W10,C8,R3*	6.80 *J3, U1*	4.50 *J3, U1*	5.575 *U1*	6.30 *U1*	6.725 *J3, U1*	6.25 *A5,J3, P6*
	Portsmouth, Ohio											6.25 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.65 *W3*						4.50 *W3,W5*				
	Youngstown, Ohio	4.65 *U1,Y1, C10,R3*	4.65 *U1,Y1, R3*	5.90 *Y1, U1*	5.575 *U1,Y1, C10*	7.425 *Y1,C10 F2*	6.80 *U1,Y1*	4.50 *U1,Y1, R3*		6.30 *Y1*	6.725 *Y1*	6.25 *Y1*
WEST	Emeryville, Cal.	5.40 *J5*	5.40 *J5*									
	Fontana, Cal.	5.35 *K1*	5.35 *K1*		6.625 *K1*		7.50 *K1*	5.15 *K1*		6.95 *K1*	7.375 *K1*	
	Geneva, Utah							4.50 *C7*			6.725 *C7*	
	Kansas City, Mo.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*					6.50 *S2*
	Los Angeles, Torrance, Cal.	5.35 *B2,C7*	5.35 *B2,C7*	7.35 *R3*	6.625 *B2*		7.50 *B2*				7.625 *B2*	7.20 *B2*
	Minnequa, Colo.	5.10 *C6*	5.10 *C6*					5.35 *C6*				6.50 *C6*
	Portland, Ore.	5.40 *O2*	5.40 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.35 *C7* 5.40 *B2,P9*	5.35 *C7* 5.40 *B2,P9*				7.55 *B2*					7.20 *C7*
	Seattle, Wash.	5.40 *B2,P12, N6*	5.40 *B2,P12*				7.55 *B2*	5.40 *B2*		7.20 *B2*	7.625 *B2*	
SOUTH	Atlanta, Ga.	4.85 *A8*	4.85 *A8*									6.45 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	4.65 *T2,R3* 5.15 *C16*	4.65 *T2,R3* 5.15 *C16*				6.80 *T2*	4.50 *T2,R3*			6.725 *T2*	6.25 *R3, T2*
	Houston, Ft. Worth, Lone Star, Tex.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*	4.85 *L3* 4.60 *S2*		6.40 *S2*	6.825 *S2*	6.50 *S2*

Steel Prices *(Effective Dec. 6, 1955)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thornedale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Disston & Sons, Inc., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Green Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P12 Pacific Steel Rolling Mills, Seattle
P13 Phoenix Mfg. Co., Joliet, Ill.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct.) f.o.b. mills. Base price about $290 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	15.50	9.25	18.50	4.25	21.00	7.75	23.50	8.50	24.00	9.50	24.50	10.00	26.00	9.75								
Youngstown *R3*	17.50	9.25	20.50	4.25	23.00	7.75	25.50	9.00	26.00	10.00	26.50	10.50	28.00	10.75								
Fontana *K1*	6.00	+9.25	9.00	+5.25	11.50	+1.75	14.00	+1.00	14.50	+0.00	15.00	8.50	16.50	9.25								
Pittsburgh *J3*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.50	26.00	11.50	26.50	12.00	28.00	11.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Alton, Ill. *L1*	15.50	0.25	18.50	4.25	21.00	7.75	23.50	8.50	24.00	9.50	24.50	10.00	26.00	9.75								
Sharon *M3*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.50	26.00	11.50	26.50	12.00	28.00	11.75								
Fairless *N2*	15.00	0.25	18.50	4.25	21.00	7.75	23.50	8.50	24.00	9.50	24.50	10.00	26.00	9.75								
Pittsburgh *N1*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.50	26.00	11.50	26.50	12.00	28.00	11.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Wheeling *W5*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.50	26.00	11.50	26.50	12.00	28.00	11.75								
Wheatland *W4*	17.00	2.25	20.50	6.25	23.00	9.75	25.50	10.50	26.00	11.50	26.50	12.00	28.00	11.75								
Youngstown *Y1*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.50	26.00	11.50	26.50	12.00	28.00	11.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Indiana Harbor *Y1*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Lorain *N2*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.50	26.00	11.50	26.50	12.00	28.00	11.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	20.0	6.25	24.00	10.25	26.00	13.75	26.50	12.50	27.00	13.50	27.50	14.00	28.00	12.75								
Youngstown *R3*	22.0	6.25	26.00	10.25	28.00	13.75	28.50	13.00	29.00	14.00	29.50	14.50	30.00	13.75								
Fairless *N2*	20.0	6.25	24.00	10.25	26.00	13.75	26.50	12.50	27.00	13.50	27.50	14.00	28.00	12.75								
Fontana *K1*	10.50		14.50		16.50		17.00		17.50		18.00		18.50									
Pittsburgh *J3*	22.0	6.25	26.00	12.25	28.00	18.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Alton, Ill. *L1*	20.0	6.25	24.00	10.25	26.00	13.75	26.50	12.50	27.00	13.50	27.50	14.00	28.00	12.75								
Sharon *M3*	22.0	6.25	26.00	12.25	28.00	18.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75								
Pittsburgh *N1*	22.0	6.25	26.00	12.25	28.00	18.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Wheeling *W5*	22.0	6.25	26.00	12.25	28.00	18.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75								
Wheatland *W4*	22.0	6.25	26.00	12.25	28.00	18.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75								
Youngstown *Y1*	22.0	6.25	26.00	12.25	28.00	18.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Indiana Harbor *Y1*	21.0	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Lorain *N2*	22.0	6.25	26.00	12.25	28.00	18.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75

Threads only, buttweld and seamless 2½ pt higher discount. Plain ends, buttweld and seamless, 3-in. and under, 4½ pt higher discount. Buttweld jobbers discount, 5 pct.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb, East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1½, 1¾ and 2 in., 1½ pt.; 2½ and 3-in., 1 pt. e.g., zinc price range of over 11¢ to 13¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

Steel Prices *(Effective Dec. 6, 1955)*

To identify producers, see Key on preceding page.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	4.725	5.65	5.825	....	....	....	....
So. Chicago *R3*	....	....	....	7.90	....	....	....
Ensley *T2*	4.725	5.65	....	....	....	....	....
Fairfield *T2*	....	5.65	....	7.90	....	5.625	....
Gary *U1*	4.725	5.65	....	....	....	5.625	....
Ind. Harbor *I3*	4.725	....	5.825	7.90	....	5.525	....
Johnstown *B3*	....	5.65	....	....	....	....	....
Joliet *U1*	....	5.65	5.825	....	....	....	....
Kansas City *S2*	....	....	....	7.90	....	....	....
Lackawanna *B3*	4.725	5.65	5.825	....	....	5.625	....
Minnequa *C6*	4.725	6.15	5.825	7.90	....	5.625	12.40
Pittsburgh *O1*	....	....	....	....	11.90	....	12.40
Pittsburgh *P5*	....	....	....	....	....	....	12.40
Pittsburgh *J3*	....	....	....	7.90	....	....	....
Seattle *B2*	....	....	....	8.40	....	5.775	12.90
Steelton *B3*	4.725	....	5.825	....	....	5.625	....
Struthers *Y1*	....	....	....	7.90	....	....	....
Torrance *C7*	....	....	....	....	....	5.775	....
Williamsport *S5*	....	5.65	....	....	....	....	....
Youngstown *R3*	....	....	....	7.90	....	....	....

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	8.40	8.60	....
Armature	9.35	9.60	10.10
Elect.	9.95	10.20	10.70
Motor	10.95	11.20	11.70
Dynamo	11.85	12.10	12.60
Trans. 72	12.80	13.05	13.55
Trans. 65	13.35	Grain Oriented	
Trans. 58	13.85	Trans. 80	17.45
Trans. 52	14.85	Trans. 73	17.95

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N5*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*).

* Coils 75¢ higher

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Cal	Woven Wire Fence 9-15½ ga. Cal	"T" Fence Posts Cal	Single Loop Bale Ties Cal	Galv. Barbed and Twisted Barbless Wire Cal	Merch. Wire Ann'l¾ ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	152	162	....	173	175	7.40	7.80
Aliquippa, Pa. *J3*	152	162	....	....	....	7.40	7.80
Atlanta *A6*	154	167	....	175	180	7.50	8.025
Bartonville *K2**	154	168	....	175	181	7.50	8.075
Buffalo *W6*	....	....	....	....	....	7.40	7.80
Chicago, Ill. *N4***	152	166	....	173	179	7.40	8.00
Cleveland *A6*	157	....	....	....	....	7.40	....
Cleveland *A5*	....	....	....	....	....	7.40	....
Crawfordsville *M4**	154	167	....	175	175	7.50	8.05
Donora, Pa. *A5*	152	162	....	173	175	7.40	7.80
Duluth *A5*	152	162	....	173	175	7.40	7.80
Fairfield, Ala. *T2*	152	162	....	173	175	7.40	7.80
Galveston *D4*	157	....	....	....	....	....	....
Houston *S2*	167	170	....	....	180	7.65	8.05
Johnstown, Pa. *B3*.*	152	166	....	....	175	7.40	7.80
Joliet, Ill. *A5*	152	162	....	173	175	7.40	7.80
Kokomo, Ind. *C9*	154	154	....	175	177	7.50	7.90
Los Angeles *B2**	....	....	....	....	....	8.35	8.925
Kansas City *S2*	167	.74	.78	....	180	7.65	8.05
Minnequa *C6*	157	167	162	178	180	7.65	8.05
Monessen *P6*	152	162	....	....	....	7.40	7.80
Moline, Ill. *R3*	....	162	162	....	....	....	....
Pittsburg, Cal. *C7*	171	185	....	....	195	8.35	8.75
Portsmouth *P7*	....	....	....	....	....	7.40	....
Rankin, Pa. *A5*	152	162	....	....	175	7.40	7.80
So. Chicago *R3*	152	162	157	173	175	7.40	7.80
S. San Francisco *C6*	....	....	....	197	195	8.35	8.75
Sparrows Pt. *B5**	154	....	....	175	181	7.50	8.075
Struthers, O. *Y1*	....	....	....	....	....	7.40	7.90
Worcester *A5*	158	....	....	....	....	7.70	....
Williamsport, Pa. *S5*	....	....	160	....	....	....	....

Galvanized products computed with zinc at 5¢ per lb. Exceptions: *zinc at 12.5¢ per lb; **13¢ zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Bristol, Conn., *W12*	....	....	10.80	12.95	15.65
Buffalo, N. Y. *R7*	7.00	8.95	10.50	12.65	15.35
Carnegie, Pa. *S9*	....	8.95	10.50	12.65	15.35
Cleveland *A5*	7.10	9.05	10.60	12.75	15.45
Detroit *D1*	7.10	9.05	10.60	12.75	....
Detroit *D2*	7.10	9.05	10.60	....	....
Harrison, N. J. *C11*	....	....	10.80	12.95	15.65
Indianapolis *C5*	7.15	9.10	10.50	12.65	15.35
New Castle, Pa. *B4*	7.00	8.95	10.50	12.65	....
New Haven, Conn. *D1*	7.45	9.25	10.80	12.95	....
Pawtucket, R. I. *N7*	7.55	9.25	10.80	12.95	15.65
Pittsburgh *S7*	7.00	8.95	10.50	12.65	15.35
Riverdale, Ill. *A1*	7.10	8.95	10.50	12.65	15.35
Sharon, Pa. *S1*	7.00	8.95	10.50	12.65	15.35
Trenton *R4*	....	....	....	....	....
Wallingford *W1*	7.45	9.25	10.80	12.95	15.65
Warren, Ohio *T4*	7.00	8.95	10.50	12.65	15.35
Weirton, W. Va. *W3*	7.10	8.95	10.50	....	....
Worcester, Mass. *A5*	7.65	9.35	10.90	13.05	15.75
Youngstown *C5*	7.00	8.95	10.50	12.65	15.35

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	30.87	36.51	29.93	....
	2½	12	41.57	49.16	40.31	....
	3	12	47.99	56.76	46.55	....
	3½	11	56.03	66.27	54.34	....
	4	10	74.41	88.00	72.17	....
National Tube	2	13	30.87	36.51	29.93	....
	2½	12	42.57	49.16	40.31	....
	3	12	47.99	56.76	46.55	....
	3½	11	56.03	66.27	54.34	....
	4	10	74.41	88.00	72.17	....
Pittsburgh Steel	2	13	30.87	36.51	....	....
	2½	12	41.57	49.16	....	....
	3	12	47.99	56.76	....	....
	3½	11	56.03	66.27	....	....
	4	10	74.41	88.00	....	....

WAREHOUSES

Base price, f.o.b., dollars per 100 lb.

Ohio City	City Delivery Charge	Sheets Hot-Rolled	Sheets Cold-Rolled	Sheets Galvanized (10 gage)	Strip Hot-Rolled	Strip Cold-Rolled	Plates	Shapes Standard Structural	Bars Hot-Rolled	Bars Cold-Finished	Alloy Bars Hot-Rolled 4615 As rolled	Alloy Bars Hot-Rolled 4140 Annealed	Alloy Bars Cold-Drawn 4615 As rolled	Alloy Bars Cold-Drawn 4140 Annealed
Baltimore	$.10	7.03	8.32	8.37	7.65	.....	7.21	7.93	7.61	8.62	14.38	13.44-13.96	16.36	16.29-16.49
Birmingham	.15	6.80	7.93	8.85	7.06	.....	6.99	7.28	7.08	9.35	.....	.....	.....	.....
Boston	.10	7.70	8.81-9.36	10.27	7.94-7.96	10.30	7.89	8.13	7.83	9.53	12.15-13.80	13.40-13.45	16.65	16.50
Buffalo	.30	6.80	7.90	9.70	7.15	.....	7.15	7.40	7.10	7.96	.....	13.10	.....	16.15
Chicago	.25	6.80	8.09	8.50	7.06	.....	6.99	7.28	7.08	7.75	13.20	12.85	16.05	15.90
Cincinnati	.25	6.92	8.33	8.90	7.30	.....	7.23	7.75	7.32	8.05	13.44	31.09	16.29	16.14
Cleveland	.30	6.80	8.09	8.85	7.16	.....	7.16	7.61	7.14	7.85	.....	12.91	.....	15.96
Denver	.....	8.60	10.76	11.22	8.90	.....	8.60	8.75	8.90	9.82	.....	.....	.....	17.97
Detroit	.25	6.99	8.28	8.78	7.34	8.15	7.27	7.75	7.36	8.04	13.40	13.05	16.25	16.10
Houston	.....	7.85	8.75	10.49	8.15	.....	7.80	8.20	8.25	9.05-9.95	14.35	14.00	17.15	17.05
Kansas City	.20	7.47	8.76	9.17	7.73	.....	7.66	7.95	7.75	8.52	13.87	13.52	16.72	16.57
Los Angeles	.10	8.05	10.00	11.00	8.35	.....	8.05	8.30	8.05	11.25	.....	14.25	.....	17.85
Memphis	.10	7.12	8.25	.....	7.38	.....	7.31	7.60	7.40	9.15	.....	.....	.....	.....
Milwaukee	.25	6.89	8.18	8.59	7.15	.....	7.06	7.45	7.17	7.94	.....	12.94	.....	15.99
New Orleans	.15	7.20	8.35	.....	7.45	.....	7.40	7.70	7.50	9.55	.....	.....	.....	.....
New York	.10	7.46	8.66	9.44	8.07	11.10	7.76	7.99	7.96	9.48	13.63	13.28	16.48	16.33
Norfolk	.20	7.25	.....	.....	7.65	.....	7.45	7.95	7.65	9.50	.....	.....	.....	.....
Philadelphia	.10	7.14	8.42	9.35	7.67	.....	7.37	7.74	7.64	8.46	13.36-13.51	13.16	16.36	16.21
Pittsburgh	.25	6.80	8.09	9.20	7.16	9.00	6.99	7.28	7.08	7.85	13.20	12.85	16.05	15.90
Portland	.....	7.80-8.60	8.80-10.15	10.65	8.00	7.95	7.75	7.85-8.15	7.95	12.20	.....	15.00	.....	17.50
Salt Lake City	.20	.....	10.60	.....	9.35	.....	.....	9.20	9.15	.....	.....	.....	.....	.....
San Francisco	.10	8.10	9.65	10.15	8.35	.....	8.05	8.25	8.05	11.20*	.....	14.25	.....	17.85
Seattle	.00 [sic]	8.55	10.40	10.80	8.65	.....	8.20	8.30	8.35	11.70	.....	14.60	.....	17.65
St. Louis	.25	7.09	8.38	9.19	7.35	.....	7.28	7.68	7.37	8.14	13.69	13.14	16.35	16.19
St. Paul	.25	7.46	8.59-9.14	9.16	7.72	.....	7.65	7.94	7.74	8.51	.....	13.51	.....	16.31

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions: (1) 1500 to 9999 lb. (2) 1000 lb or over. (3) $.35 delivery. (4) 1000 to 1999 lb, $.35 delivery.

* Plus analysis charge.

Miscellaneous Prices

(Effective Dec. 6, 1955)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb
18	4	1	—	—	$1.60
18	4	1	—	5	2.305
18	4	2	—	—	1.765
1.5	4	1.5	8	—	.96
6	4	2	6	—	1.35
6	4	2	5	—	1.105

High-carbon chromium	.77
Oil hardened manganese	.43
Special carbon	.39
Extra carbon	.33
Regular carbon	.275

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

Stainless Type	Cladding	Plate (*A3, J2, L4*) 10 pct	Plate (*A3, J2, L4*) 15 pct	Plate (*A3, J2, L4*) 20 pct	Sheet (*I2*) 20 pct
304		30.30	33.15	36.05	32.50
316		35.50	38.45	41.40	47.00
321		32.00	34.85	37.75	37.25
347		34.40	37.90	41.40	46.25
405		25.80	29.60	33.35	.....
410, 430		25.30	29.10	32.85	.....

CR Strip (S9) Copper, 10 pct, 2 sides, $8.00; 1 side, 30.00.

LAKE SUPERIOR ORES

$1.50% *Fe; natural content, delivered lower Lake ports. Prices effective for* 1955 *season.*

	Gross Ton
Openhearth lump	$11.25
Old range, bessemer	10.40
Old range, nonbessemer	10.25
Mesabi, bessemer	10.25
Mesabi, nonbessemer	10.10
High phosphorus	10.00

COKE

Furnace, beehive (f.o.b. oven)	Net-Ton
Connellsville, Pa.	$14.00 to $14.50
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$16.00 to $16.50
Foundry, oven coke	
Buffalo, del'd	$28.08
Chicago, f.o.b.	25.75
Detroit, f.o.b.	26.25
New England, del'd	26.05
Seaboard, N. J., f.o.b.	25.50
Philadelphia, f.o.b.	25.00
Swedeland, Pa., f.o.b.	25.00
Plainesville, Ohio, f.o.b.	25.50
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, f.o.b.	24.40
Lone Star, Tex., f.o.b.	19.50

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	GRAPHITE Length (In.)	GRAPHITE Price	CARBON* Diam. (In.)	CARBON* Length (In.)	CARBON* Price
24	84	23.00	40	100, 110	9.90
20	72	22.25	35	110	9.90
16 to 18	72	22.50	30	110	10.05
14	72	23.00	24	72 to 84	10.30
12	72	23.50	20	90	10.10
10	60	24.25	17	72	10.35
7	60	24.50	14	72	10.85
6	60	27.25	12	60	11.75
4	40	30.25	10	60	11.80
3	40	32.00	8	40	12.10
2½	30	33.75			
2	24	52.50			

* Prices shown cover carbon nipples.

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolt

	Discounts Full case Quantity	Full case 20,000 lb. or more
½ in. & smaller x 6 in. & shorter	61	63
Larger than ½ in. diam. and all diam. longer than 6 in.	55	57
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	61	63
Lag, all diam. x 6 in. & shorter	61	63
Lag, all diam. longer than 6 in.	55	57
Plow bolts	61	63

Nuts, Hex., H.P., reg. & hvy.

⅝" or smaller	64	66
¾" to 1¼" inclusive	63	65
1⅜" to 1½" inclusive	65	67
1⅝" and larger	61	63

C.P. Hex. regular & hvy.

⅝" or smaller	64	66
⅞" and larger	61	63

Hot Galv. Nuts (all types)

1½" or smaller	44	47

Finished, Semi-finished, Hex. Nuts

¾" and smaller	66	66
⅞" and larger	63	63

Add 25% for less than case or keg quantity.

Rivets

	Base per 100 lb
½ in. and larger	$9.95
	Pct Off List
7/16 in. and smaller	22

Cap Screws

	Discount H.C. Heat Bright Treated
New std. hex head, packaged ¼" thru ½" diam. x 6" and shorter	34 / 20
9/16 and ⅝" x 6" and smaller and shorter	31 / 16
¾", ⅞", 1" x 6" and shorter	9 / +11
New std. hex head, bulk* ¼" thru ½" diam. x 6" and shorter	49 / 41
9/16" and ⅝" diam. x 6" and shorter	48 / 39
¾", ⅞", 1" x 6" and shorter	31 / 20

*Minimum quantity per item: 15,000 pieces ¼", 5/16", ⅜" diam. 5,000 pieces 7/16", ½", 9/16", ⅝" diam. 2,000 pieces ¾", ⅞", 1" diam.

Machine Screws & Stove Bolts

	Discount Mach. Screws	Stove Bolts
Packaged, package list	27	38
Bulk, bulk list		
Quantity		
¼-in. diam. & under	25,000-200,000	20 / 61
5/16-in. diam. & larger	15,000-100,000	20 / 61
All diam. over 3 in. lung	5,000-100,000	— / 61

Machine Screw & Stove Bolt Nuts

	Discount Hex	Square
Packaged, package list	24	27
Bulk, bulk list		
Quantity		
⅝-in. diam. & smaller	25,000-200,000	18 / 20

CAST IRON WATER PIPE INDEX

Birmingham	109.3
New York	131.5
Chicago	133.9
San Francisco-L. A.	131.1

Nov. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick — *Carloads per* 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa., (except Salina, Pa., add $5.00)	$122.00
No. 1 Ohio	
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	18.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$128.00
Childs, Hays, Pa.	133.00
Chicago District	138.00
Western Utah	144.00
California	151.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O.	145.00
Curtner, Calif.	163.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	21.00
Silica cement, net ton, bulk, Hays, Pa.	24.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	22.00
Silica cement, net ton, bulk, Utah and Calif.	32.00

Chrome Brick — *Per net ton*

Standard chemically bonded, Balt.	$91.00
Standards chemically bonded, Curtner, Calif.	101.25
Burned, Balt.	85.00

Magnesite Brick

Standard Baltimore	$114.00
Chemically bonded, Baltimore	102.00

Grain Magnesite — *Bt. ⅝-in. grains*

Domestic, f.o.b. Baltimore in bulk fines removed	$64.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	40.00
in sacks	46.00

Dead Burned Dolomite — *Per net ton*

F.o.b. bulk, producing points in: Pa., W. Va., Ohio	$15.00
Midwest	15.60
Missouri Valley	14.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	9.50¢
Canadian sponge iron, Del'd in East, carloads	9.5¢
Domestic sponge, iron, 98+% Fe, carload lots	9.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.84% pure	22.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 00.8+% Fe	86.0¢ to $1.55
Aluminum freight allowed	34.50¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	61.50¢
Copper, reduced	61.50¢
Cadmium, 100-199 lb. 95¢ plus metal value	
Chromium, electrolytic, 99% min., and quality, del'd	$3.60
Lead	7.50¢ plus metal value
Manganese	70.0¢
Molybdenum, 99%	$3.00 to $3.25
Nickel, unannealed	$1.00
Nickel, annealed	$1.06
Nickel, spherical, unannealed, #50	$1.18
Silicon	43.50¢
Solder powder .7.0¢ to 9.0¢ plus met. value	
Stainless steel, 302	99.0¢
Stainless steel, 316	$1.32
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$4.50
Zinc, 10 ton lots	18.75¢ to 32.50¢

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Expray-AP

An all-purpose, rust-inhibiting metal cleaner for spray washers

Here's a new alkaline spray cleaner that fills a definite need in metal cleaning. Not just an improved version of cleaners already on the market, Wyandotte's EXPRAY-AP is unique . . . research-developed, proved in use. Here are some typical spray-cleaning applications:

Steel parts — EXPRAY-AP is excellent for removing fabricating soils and preventing rust — even cold in a one-stage washer.

Zinc die castings — EXPRAY-AP is nonetching and provides protection against staining.

Cast-iron parts — EXPRAY-AP removes chips and dust, prevents rust on machined surfaces.

Glass — EXPRAY-AP eliminates streaking, removes pitch, rouge, and oils from lenses and other glass products.

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EXPRAY-AP gives you all these benefits — *and more!*

Powerful cleaning action — contains free-rinsing synthetic detergents!

Easy to use — noncaustic, nondusty, free-flowing!

Low-foaming — even at high concentrations and in high-pressure washers!

Prevents scale — even in hardest water!

Prevents rust — contains its own rust inhibitor!

Economical — lower use-cost and reduced equipment maintenance!



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WYANDOTTE CHEMICALS CORPORATION
Wyandotte, Michigan

Please send me further information and technical data on EXPRAY-AP.

Name _____

Company _____

Address _____

City _____ Zone ____ State _____

Ferroalloy Prices

(Effective Dec. 6, 1955)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk, carloads, del'd, 67-71% Cr, .20-1.00% max. Si.

0.02% C	38.50	0.20% C	35.50
0.06% C	36.50	0.50% C	35.25
0.10% C	36.00	1.00% C	34.00
0.15% C	35.75	2.00% C	33.75

4.00-4.50 C, 67.70% Cr, 1-2% Si . . . 26.25
3.50-5.00% C, 57-64% Cr, 2.00-4.00% Si . . . 25.00

S. M. Ferrochrome

Contract prices, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	28.65
Ton lots	30.55
Less ton lots	32.05

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 3¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.27
0.50% max. C	1.27
9 to 11% C, 88-91% Cr, 0.75% Fe	1.36

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Contract price, carloads, delivered, lump, 2-in. x down, per lb of Cr, packed.

Carloads	41.85
Ton lots	46.15
Less ton lots	48.65

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.

30-32% Ca, 60-65% Si, 3.00 max. Fe.

Carloads	22.95
Ton lots	25.25
Less ton lots	26.75

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	23.05
Ton lots	24.95
Less ton lots	25.95

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ⅛ in. x 12 mesh.

Ton lots	19.65
Less ton lots	20.90

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	16.70
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	9.50
Clairton, Pa.	9.50
Sheridan, Pa.	9.50
Philo, Ohio	9.50

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	12.10
Ton lots packed	14.30

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$86.00
19 to 21%	3% max.	88.00
21 to 23%	3% max.	90.50

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.00
Ton lots	43.50

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	30.00
Ton lots	32.00
250 to 1999 lb	34.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn . . 21.85

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	22.00	23.85	25.05
0.07% max. C	29.95	31.80	33.80
0.15% max. C	28.45	30.30	31.50
0.30% max. C	26.95	28.80	30.00
0.50% max. C	26.45	28.30	29.50
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	23.45	25.30	26.50

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carload bulk	11.20
Ton lots	12.65
Briquet contract basis carloads, bulk, delivered, per lb of briquet	12.70
Ton lots, packed	14.90

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $90.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00. Add $1.00 per ton for each additional 0.50% Si up to and including 17%. Add $1.45 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96.50% Si, 2% Fe	22.75	21.45
98% Si, 1% Fe	23.25	21.95

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	6.75
Ton lots, packed	9.35

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.

50% Si	11.75	75% Si	15.40
65% Si	14.50	85% Si	17.10
	90% Si	18.50	

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.95	$2.95	$3.75
Less ton lots	2.40	2.30	4.55

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.

Openhearth	3.10
Crucible	3.20
High speed steel (Primos)	3.30

Alsifer, 20% Al, 40% Si, 40% Fe,

Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo . . . $1.28

Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Cb plus Ta $4.65

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo . . . $1.46

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton . . . $90.00
10 tons to less carload . . . $110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti . . . $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti . . . $1.50
Less ton lots . . . $1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton . . . $177.00

Ferrotungsten, ¼ x down, packed, per pound contained W, ton lots, f.o.b. . . . $3.45

Molybdic oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa. . . . $1.27
bags, f.o.b. Washington, Pa., Langeloth, Pa. . . . $1.24

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	15.50¢
Ton lots, packed lump	16.75¢
Less ton lots	$1.55

Vanadium oxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5 . . . $1.32

Zirconium contract basis, per lb of alloy

35-40%, f.o.b. freight allowed, carloads, packed	26.25¢
12-15%, del'd, lump, bulk-carloads	8.50¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed. B, 3.14%, Si 40-45%, per lb contained 2 . . . $5.25

Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2% Si 2-4%, Al 1-2%, C 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed

Ton lots per pound	10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots . . . 1.20
F.o.b. Wash., Pa.; 100 lb up

10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa. freight allowed, 100 lb and over

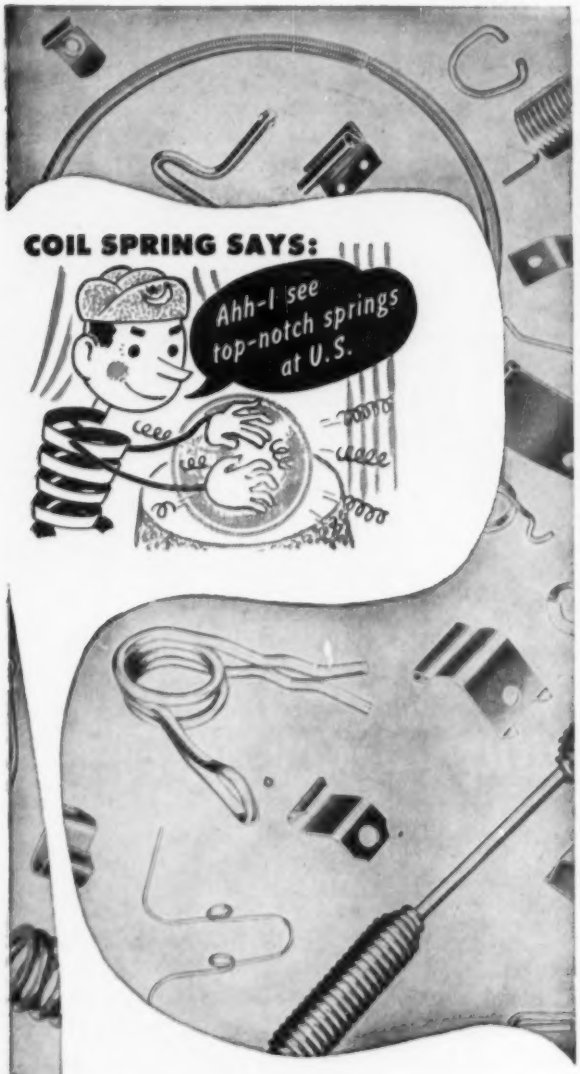
No. 1	$1.00
No. 79	50¢

Manganese - Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.40
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots . . . $2.05

Silcaz, contract basis, delivered.
Ton lots . . . 45.00¢



We're specialists with years of "know-how" in the economical manufacture of springs, wire forms and small parts that operate exactly to your specs. We're proud of the springs we make. Big or little, any shape, any quantity. Throughout manufacture we check the quality of our products with the most up-to-date testing devices to insure complete and everlasting customer satisfaction. So, if it's springs you want, why not give us a call. You'll see the difference!

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Stocks maintained of:

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"ANYTHING containing IRON or STEEL"

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

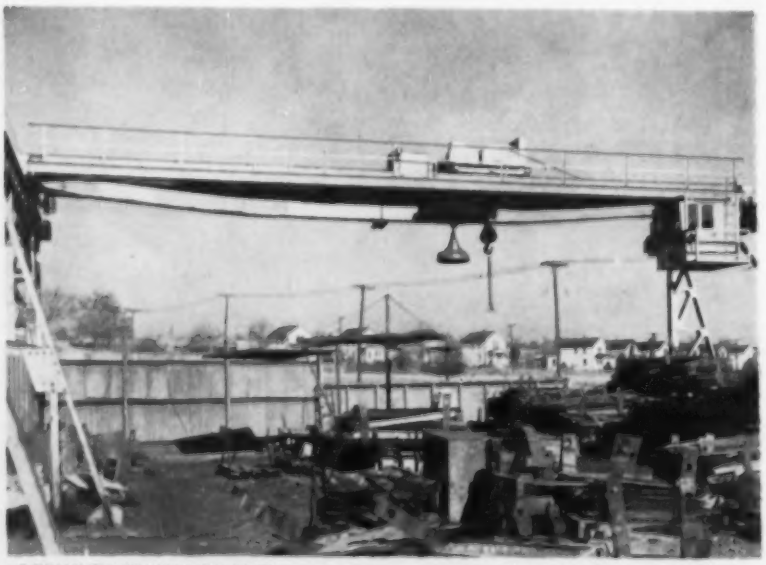
Makes News in Cleveland . . . Heavy crane rebuilders are currently doing a good business and saving their customers a good slice of money to boot. A case in point is Ohio Crane and Engineering Co., Cleveland, specialists in reconditioning 10 to 250 ton capacity fabricated cranes from 50 to 250 ft spans. Prices vary according to the condition and extent of rebuilding necessary. In general a used crane can be completely rebuilt and sold with a new crane guarantee at about 55 pct of the cost of a new one. Dismantling and erection costs are about the same for new and reconditioned units so they cancel each other out on price comparisons.

Rebuilders Plenty Busy . . . One recent reconditioning job on a 40-ton crane for a Pittsburgh steel mill cost $40,000 while a new one was quoted at $75,000. Actually builders are so loaded now that delivery dates are longer on reconditioned cranes than on new ones. Some rebuilt cranes are out to two years in the industry while new ones can be obtained in about one year from some manufacturers. Ohio Crane also builds new specialty units such as ingot cranes and lumber grapples.

According to General Manager Virl Berry, the firm has a backlog of 12 months' work, although emergency and breakdown work has been pushed through in three weeks. If all available business were taken, deliveries would probably be further extended.

On emergency or breakdown cases, the jobs are put through the shop using extra crews of experienced iron workers from a neighboring fabricating plant under a long term agreement. Cranes can also be taken in trade with another reconditioned one being sent to the customer. In other cases they can be loaned to the customer while his unit is being rebuilt.

Do Special Jobs . . . A substantial portion of rebuilding is done for special steel mill cranes. Some of the higher quality cranes built in the 20's can be "beefed up" about 20 to 25 pct.



REBUILT HEAVY CRANE gets test run over yard load. A completely rebuilt job with new crane guarantee runs about 55 pct cost of new machine.

CONSIDER GOOD USED EQUIPMENT FIRST

ANGLE BENDING ROLLS
3 x 3 x ⅜" Buffalo No. 1
1¾"x1¾"x1¾" Niagara No. 3
BALERS
#123P-66 Logemann, Charging Box 66x18x24. Produces Bale 125 to 150 lbs.
#125-TC Galland Henning. Volume of Box 145 cu. ft., Bale Size 500 to 800 lbs.
BENDING ROLLS
8' x 3/16" Bertsch Initial Type
10' x 1¼" Bertsch Initial Type
12' x ⅝" Niles Pyramid Type
16' x ¾" Bertsch Initial Type Bending Roll
18' x ⅝" Wickes Pyramid Type
BRAKES—LEAF TYPE
12' x ⅝" Dreis & Krump
12' x ⅛" Dreis & Krump, Motor Driven
BRAKES—PRESS TYPE
12' All Steel Press Brake, 350 ton Capacity
12' x 5/16" Pacific Hydraulic, 300 ton
BROACH
Model VP-4-40-40 American Vertical Hydr. Broach. Max Capacity 40 ton, Stroke 40", Motor Drive
CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H	29' Span 230 Volt D.C.
5 ton Northern	50' Span 230 Volt D.C.
5 ton Cleveland	90' Span 230 Volt D.C.
7½ ton P&H	65' Span 440/3/60 A.C.
10 ton Niles	52' Span 230 Volt D.C.
10 ton Milwaukee With 5 ton Auxiliary	80' Span 230 Volt D.C.
10 ton P&H	90' Span 230 Volt D.C.
15 ton P&H	56' Span 230 Volt D.C.
20 ton P&H	60' Span 230 Volt D.C.
30 ton Toledo	75' Span 550/3/60 A.C.
50 Shaw	60' Span 230 Volt D.C.
120 ton Whiting With 10 ton Auxiliary	80' Span 220/3/60 A.C.

FORGING MACHINES
1" to 5" Acme, Ajax, National
1", 4", 5", National High Duty, Air Clutch
FURNACES
Lee Wilson Natural Gas Annealing Furnace. Work Dimensions 42" coil, 96" Piling Height
Ther-Monic Induction Heater Model 1400
2 ton Swindell Dressler, Top Charge
6 ton Heroult Top Charge
15 ton Heroult Top Charge, With Transformer
HAMMERS—BOARD DROP—STEAM DROP
STEAM FORGING—800 lb. to 20,000 lb.
12,000 lb. Chambersburg Steam Forging
LEVELERS—ROLLER
52" McKay 17 Rolls 3⅝" Dia.
72" McKay 15 Rolls 4½" Dia.
PRESSES—HYDRAULIC
300 ton United Steam Hydr. Forging Press
550 ton Baldwin Southwark, 12" Stroke 48" x 25" Between Columns
800 ton Clearing, 48" Stroke, Bed Area 48" x 48"
1000 ton Lake Erie Double Acting, 40" Stroke, Bed Area 72" x 146"
1257 ton Baldwin Southwark Forging Press, 30" Stroke Main Ram, 54" x 41" Bet. Columns
2045 ton Birdsboro, 4 Columns, 14" Stroke Platen 42" x 40", Daylite 47"
4500 ton B-L-H Hydr. Forging Press
PRESS—Straight Side
Clearing Model TF41500-200 Triple Acting, Strokes 40, 32, 14", Bed Area 100" x 200"
PUNCH & SHEAR COMBINATIONS
BLUEFG 25 Pels Universal Ironworker, Capacity Punch 1¼ thru ⅝", Shear Angles 6x6x⅝
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SHEAR—ANGLE
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2	1750	G.E.	1.00	2300	3600
1	1000	El. Mchy.	1.00	440/220	1200
1	750	G.E.	.80	2300	1200
1	750	G.E.	.80	2300	450
1	710	G.E.	.80	2300/440	720
2	600	G.E.	1.00	2300	327
6	350	G.E.	1.00	2300	900
1	300	G.E.	1.00	2300	720
1	250	G.E.	1.00	2300	514
1	200	G.E.	.80	2300/440	720
1	250	G.E.	1.00	440/220	450
1	200	Whse.	.80	440/220	1200
1	200	G.E.	.80	440/220	450
1	200	El. Mchy.	.80	2300	600
1	150	G.E.	1.00	2200	900
2	150	G.E.	.80	440/220	720
1	150	G.E.	1.00	550	600
1	150	Whse.	.80	440/220	450
2	135	G.E.	.80	4600/2300	1200
1	125	G.E.	.80	2200	900
1	100	Whse.	.80	440/220	1800
1	100	Ideal	.80	440/220	900
2	100	G.E.	.80	440/220	600
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2	150	G.E.	3	2400/4160-240/480
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500	G.E.	KT-424	450
400	G.E.	KT-424	360
350	Ideal	A	1800
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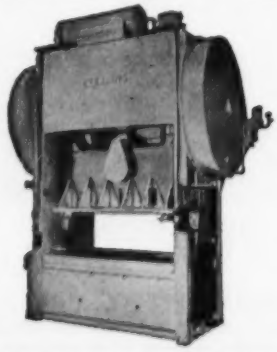
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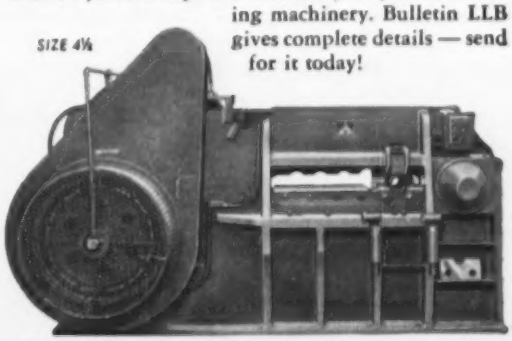
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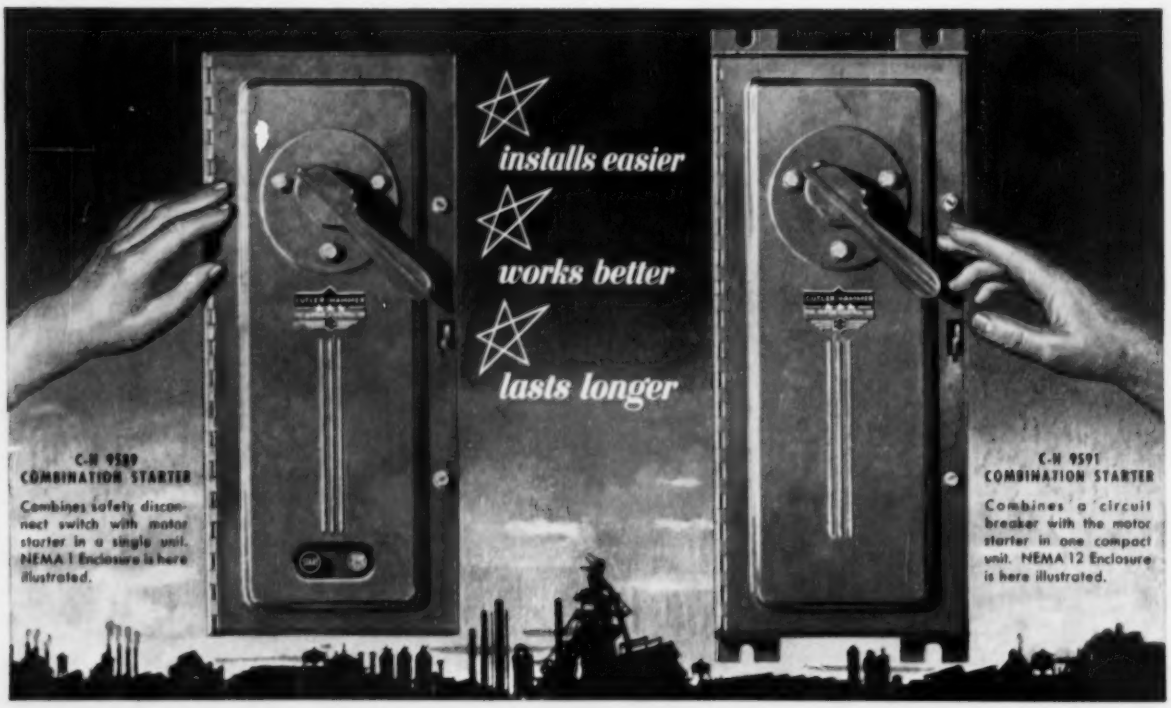
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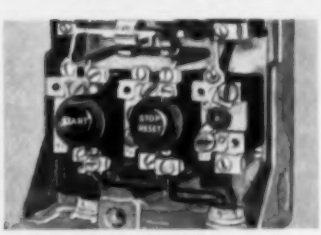
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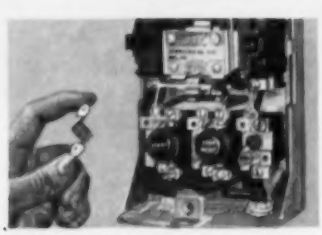
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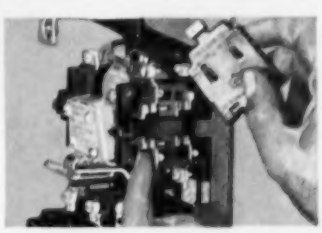
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